

REPORT

Port of Leith Outer Berth Development

Approach Channel Deepening Geoarchaeological
Assessment Method Statement and Protocol for
Archaeological Discoveries

Client: Forth Ports Limited

Reference: PC4514-RHD-YY-XX-RP-EV-0030

Status: Final/01

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1 Introduction

1.1 Project Background

Forth Ports Limited (“Forth Ports”) is improving the Outer Berth at the Port of Leith (“the Port”) to support the offshore renewable energy industry. In December 2022, marine licences were granted by Marine Scotland’s Licensing Operations Team (MS-LOT) (now Marine Directorate’s Licensing Operations Team (MD-LOT)) for improvement works to the Outer Berth (MS-00009818) as well as the disposal of associated dredged material (MS-00009819). An Environmental Impact Assessment (EIA) was undertaken on the Outer Berth development (herein referred to as “the Outer Berth EIA”) and an EIA Report produced to support the licence applications (Royal HaskoningDHV, 2022).

The current water depth of the Leith approach channel (between -6.5m Chart Datum (CD) and -7.0m CD) significantly limits the tidal window during which deep-drafted vessels can access the Outer Berth and, on some neap tides, access is not possible at all. Given this, the increased water depth required by the evolving offshore renewables industry and limited vessel availability, Forth Ports is proposing to deepen the approach channel to the Port of Leith. The deepening of the approach channel would not change the number of vessel movements to the Outer Berth as described in the Outer Berth EIA Report. Instead, its purpose is to increase the frequency and length of the tidal window when deeper drafted vessels can access the Outer Berth.

The proposed deepening would increase the depth of the approach channel to -9.0m CD and extend the offshore extent, from the current maintenance dredge limit to the -9.0m CD contour within the Firth of Forth. The Outer Berth berth pocket, most of which will have been deepened to -9.0m CD as part of the consented Outer Berth development, would be repositioned northwards, increased in size, and deepened to -13.0m CD.

It is anticipated that the dredge and disposal activities would be completed within approximately four months, with approximately 1,300,000m³ of material removed, approximately 1,410,000m³ including a 0.25m over-dredge allowance. Disposal would be at Narrow Deep B Spoil Disposal Ground (FO038).

In order to ensure the stability of the Eastern Breakwater following the repositioning and deepening of the berth pocket, a short retaining wall approximately 45m in length will be installed between the dredge pocket and the toe of the breakwater.

To summarise, the Proposed Scheme comprises the following elements:

- Deepening of the approach channel to -9.0m CD;
- Deepening of the Outer Berth pocket to -13.0m CD;
- Disposal of dredge material at the Narrow Deep B disposal site; and
- Installation of a retaining wall at the toe of the Eastern Breakwater.

Marine licences are now being sought from MD-LOT to permit the installation of the short retaining wall and disposal of the additional volume of material associated with the Proposed Scheme.

1.2 Purpose of this document

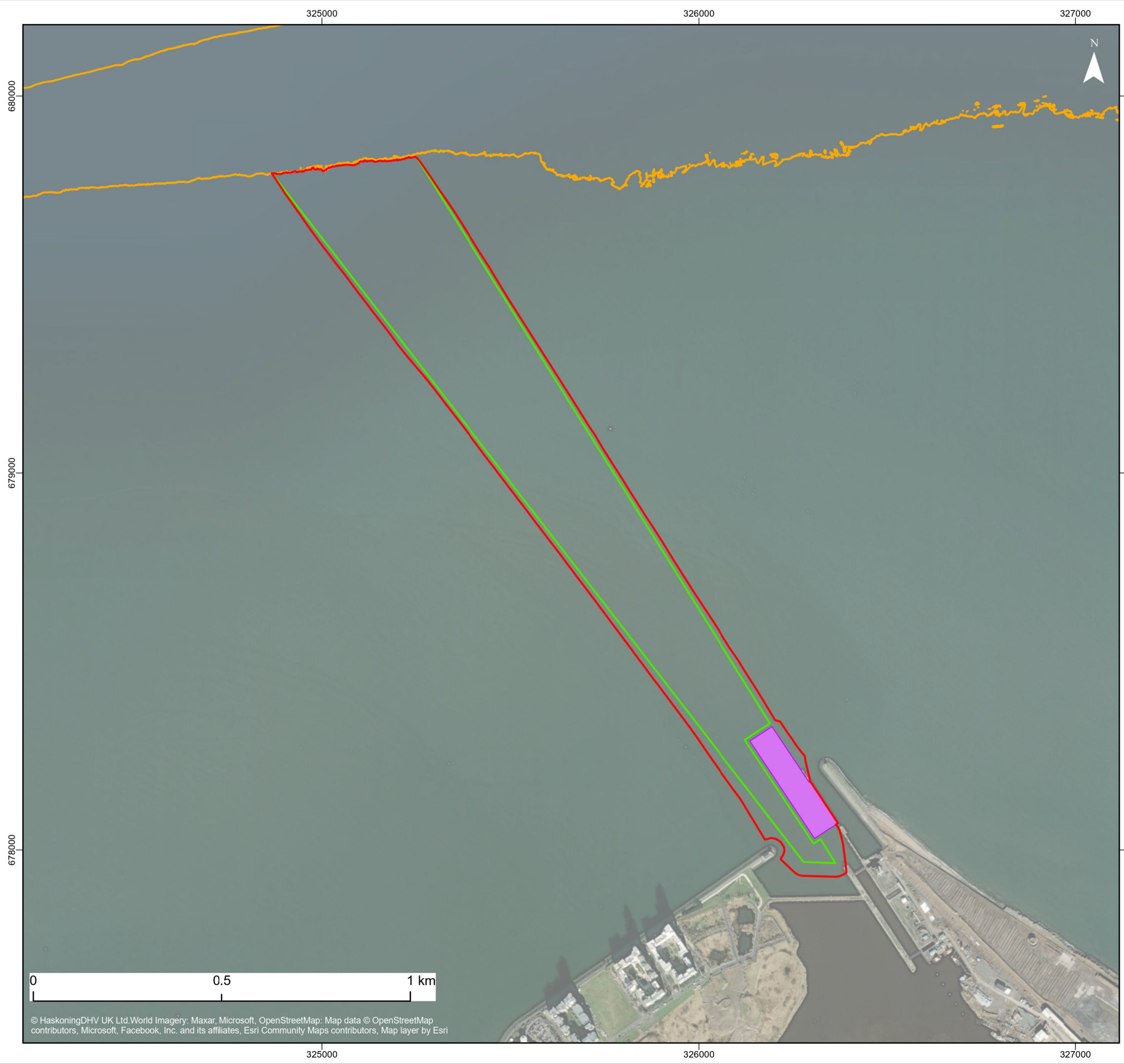
An Environmental Scoping Report (ESR) (Royal HaskoningDHV, 2023a) was submitted to MD-LOT to confirm the scope of work required to inform a supplementary EIA (sEIA), to the Outer Berth EIA, to assess the proposed deepening of the approach channel and associated works. The ESR scoped heritage and archaeology out of the sEIA, proposing that a Geoarchaeological Method Statement and Protocol for Archaeological Discoveries (PAD) be submitted to support the marine licence applications. This approach was confirmed by Historic Environmental Scotland's (HES) consultation response in the Scoping Opinion issued by MD-LOT, as follows:

'The assessment of the potential impacts can be found in section 4.9 of the Scoping Report. It concludes that marine archaeology and cultural heritage can be scoped out of further assessment in the Supplementary EIA Report but that a geoarchaeological method statement and Protocol for Archaeological Discoveries ("PAD") will be produced.'

As such, this document comprises the Geoarchaeological Method Statement and PAD for the Proposed Scheme. It has been produced in support of the marine licence applications to MD-LOT.

1.3 Study Area

The Study Area for this Geoarchaeological Method Statement and PAD comprises the footprint of the proposed deepening at the Port of Leith (as shown by the proposed dredge area outlined in red on **Figure 1-1**).



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- Legend**
- Dredge Area including slopes
 - 9mCD Approach Channel
 - 13mCD Berth Pocket
 - 9mCD contour

Client:	Project:
Forth Ports Limited	Port of Leith Outer Berth: Approach Channel Deepening

Title:

Footprint of the Proposed Deepening
at the Port of Leith

Figure: 1.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
1	30/11/2023	TC	EF	A3	1:10,000

Co-ordinate system: British National Grid



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2 Archaeological Summary

To establish the archaeology and cultural heritage baseline, the following open source datasets were accessed:

- GIS data for designated heritage assets available from HES;
- GIS data for non-designated heritage assets (including maritime records) from Canmore (National Record of the Historic Environment) maintained by HES; and
- GIS data on charted, uncharted, live, and dead wrecks and obstructions from the Admiralty Marine data portal.

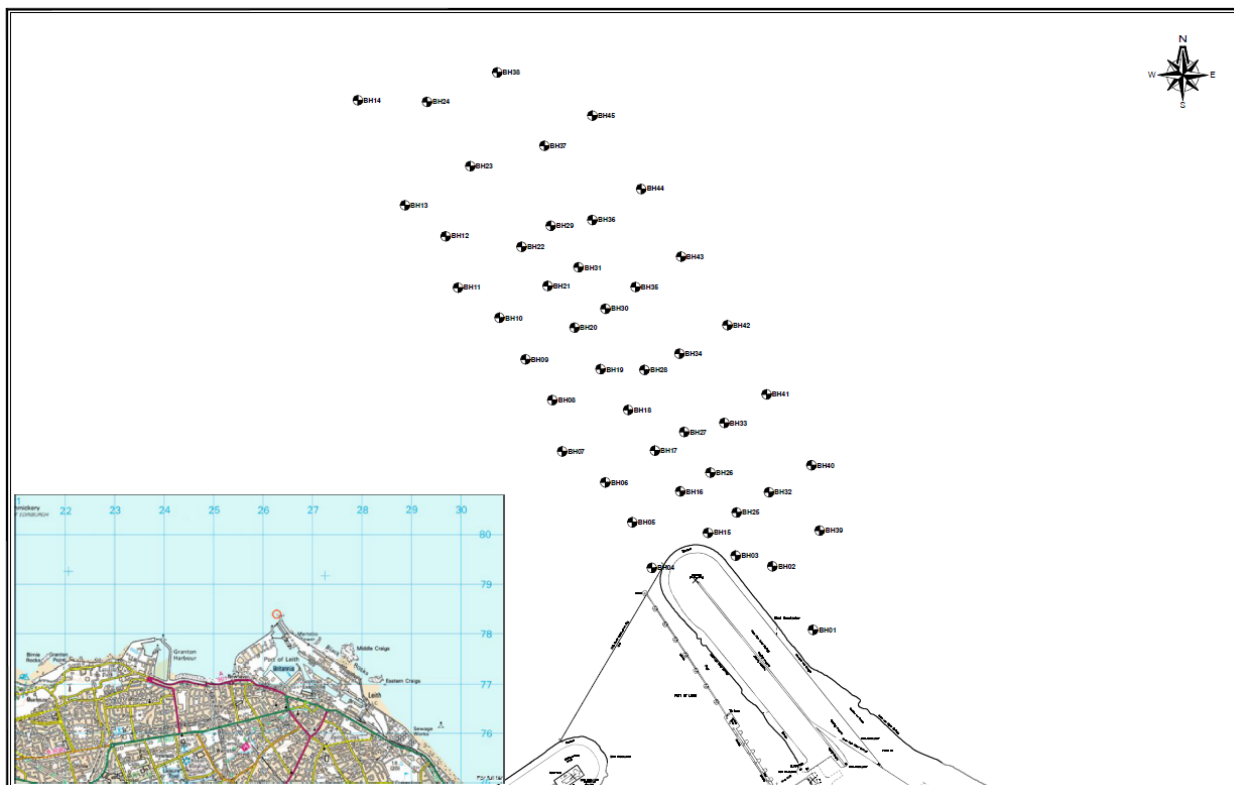
2.1 Maritime Archaeology

These datasets show that there are no known designated or non-designated heritage assets within the dredge footprint.

There are, however, several reported losses of vessels recorded in the Canmore maritime data in the vicinity of Leith, which record historic accounts of vessels lost but not subsequently found. This includes losses reported around Leith Roads, as described in the ESR (an area now incorporated within the Outer Harbour at Leith Docks), as well as general loss locations 'off Leith'. The general locations are outside the proposed dredge footprint; however, they can provide an indication of the potential for previously unrecorded maritime remains to be present within the footprint.

2.2 Geotechnical Data

Fugro Engineering Services completed 45 boreholes to the north-northwest of the eastern breakwater in 2012 (**Figure 2-1**). The general geological succession comprised bedrock of interbedded mudstone, siltstone and sandstone overlain by sandy gravelly clay with gravel bands (till) overlain by recent clay / silt / sand / gravel (Fugro Engineering Services, 2013). No *in-situ* deposits representing preserved prehistoric land surfaces, or deposits of palaeoenvironmental geoarchaeological interest, were identified in these boreholes.



Further geotechnical investigations were undertaken in 2021 by Dunelm Geotechnical and Environmental. Eight vibrocores and three boreholes were acquired for the Outer Berth pocket (**Figure 2-2**). All three boreholes and six of the vibrocores show the same general geological succession as above (bedrock overlain by till and recent bed sediments) (Dunelm, 2022a).

This silt deposit with peat lenses was also recorded at the top of VC03 (very soft dark grey to black slightly sandy organic silt with occasional thickly laminated peat lenses) to a depth of 0.4m below bed level. This was noted as containing shell fragments indicative of a marine origin and suggesting reworking.



Figure 2-2 Location of boreholes and vibrocore samples collected in 2021 (Dunelm, 2022a)

A further campaign of geotechnical survey was undertaken in May 2022. This comprised 17 vibrocores from the Outer Berth (Dunelm, 2022b) (**Figure 4**). VCN08, located c.20m of VC01A, recorded the presence of medium, gravel sized peat pockets with a dark grey to black slightly sandy silt from 0.25 to 0.48m below bed level, directly underlying the soft silts. These 'gravel-sized peat pockets' were also noted within silts in VCN06, and within the stiff clays (tills) in VCN12. This again suggests reworking and disturbance of the bed deposits.



Figure 2-3 Location of vibrocore samples collected in 2022 (Dunelm, 2022b)

Between 28 August and 29 August 2023, a further 14 vibrocores were acquired by Causeway Geotech from the proposed dredge area (**Figure 2-4**). The results reflect the 2012 survey (**Figure 2-1**), with sediments described as shoreface and beach deposits (typically, very soft sandy silt with abundant shell fragments) overlying glacial till (typically, firm to stiff sandy gravelly clay with occasional shell fragments and cobbles) (Causeway Geotech, 2023).



Figure 2-4 Location of vibrocore samples collected in 2023 (Causeway Geotech, 2023)

2.3 Geophysical Survey

Geophysical survey data were acquired by Aspect Land and Hydrographic Surveys in July 2023 (Aspect Land and Hydrographic Surveys, 2023). This comprised multibeam echosounder (MBES), side-scan sonar (SSS), magnetometer (Mag) and sub-bottom-profiler data (SBP).

The following equipment was used to acquire the data:

- R2Sonic 2022 Multibeam System 400kHz
- Edgetech 4125 dual frequency side-scan sonar
- A single G882 magnetometer

The geophysical data have not been archaeologically assessed, although the geophysical contractor's reporting and contact lists have been reviewed by Royal HaskoningDHV's marine archaeological specialist in order to assess the potential for anomalies to represent archaeological material.

118 objects were seen in the MBES data in the dredge footprint. These were reported by the geophysical contractor to largely comprise boulders, tyres, linear objects likely representing chain and anchor blocks. Several objects have been identified as rectangular, liner or vertical objects, so their origin is unclear. A total of 87 SSS targets were identified. These consist of tyres, debris, and unidentified objects. 467 isolated

magnetic anomalies were also identified indicating the presence of ferrous material, which could be of historic origin but which may equally represent modern debris related to harbour activities.

The positions of the objects were compared against the maintained dredge areas to inform Royal HaskoningDHV's review and the majority of the MBES and SSS anomalies are located within the area of the Approach Channel that is maintained through dredging. This indicates that they likely represent modern debris lost since the last time dredging took place or boulders uncovered through dredging.

Although there is potential that some of these isolated objects and magnetic anomalies could represent historic artefacts, due to this historic disturbance there is limited potential for *in-situ* archaeological material. As such, a PAD will be implemented during the dredging work to mitigate and manage any archaeological find that are found during the works (see **Section 5**).

In terms of the SBP data, four horizons have been interpreted (**Figure 2-5**). The first horizon (blue) is the seabed. The second horizon, called H1 (yellow), is thought to represent a recent sedimentary package. The third horizon H2 (pink) is thought to represent the top of rockhead as it is characterised by irregular surface likely to be an erosion surface and with no coherent acoustic signal underneath. Based on the geological data that erosional surface is the interface between rocks and unconsolidated sediments. The fourth horizons, located to the north of the dredge area, represents acoustic blanking. This interpretation mirrors that of the geotechnical results indicating the presence of unconsolidated sediments, overlying till which in turn overlies the bedrock.

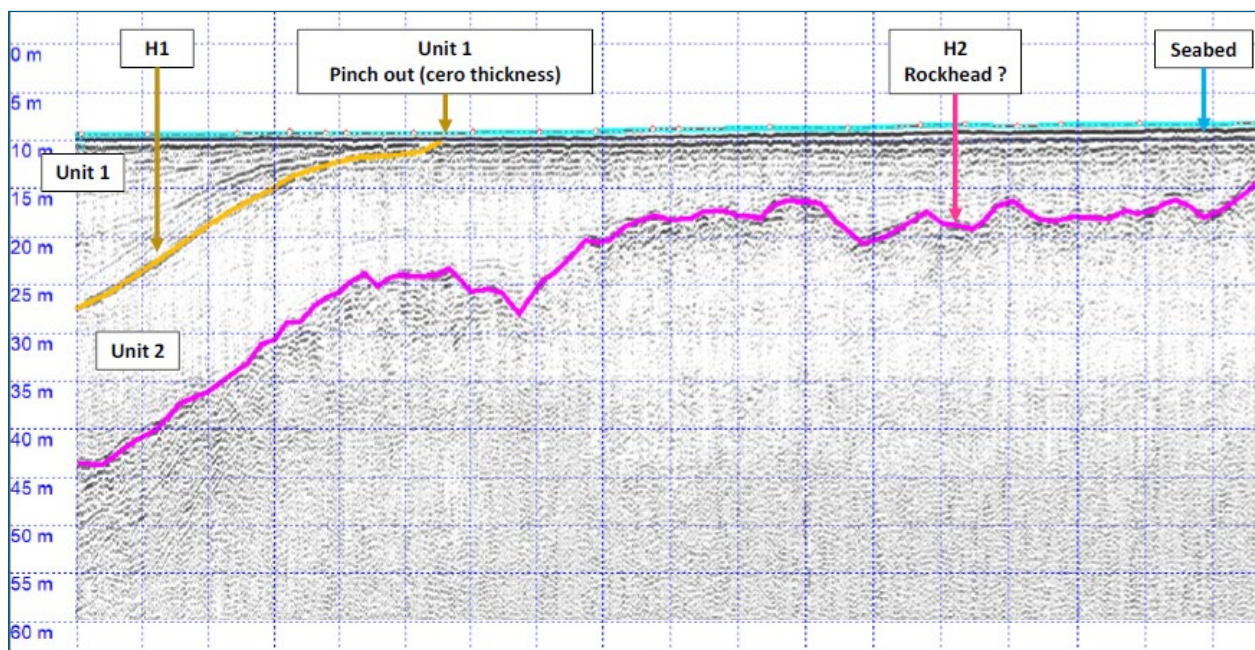


Figure 2-5 SBP profile (Aspect Land and Hydrographic Surveys, 2023)

3 Summary of Potential Impacts

As much of the dredge footprint is already part of the maintained dredge area, previous disturbance from historic dredging activity suggests limited potential for the survival of *in-situ* archaeological remains, and nothing of significance was identified within the dredge footprint outside of the maintenance dredge area. The potential for encountering archaeological material during dredging therefore is anticipated to be limited to isolated and fragmentary finds, rather than *in-situ* wrecks or submerged prehistoric sites. The potential for *in-situ* deposits of paleoenvironmental interest is also expected to be limited, with previous disturbance resulting in reworking and redeposition of deposits and nothing of significance being recorded outside of the maintenance dredge area.

While changes in tidal currents may affect the stability of nearby archaeological features, and indirect impacts to heritage assets may occur if buried heritage assets become exposed to increased wave / tidal action, there will be no significant change to the local hydrodynamic and sedimentary processes (as explained in Chapter 7 of the sEIA report (Royal HaskoningDHV, 2023b)). Conversely, increased sedimentation may result in an exposed site becoming buried, thereby adding some protection.

4 Geoarchaeological Assessment of Geotechnical Data

4.1 Geoarchaeological Assessment of Geotechnical Data

Following the completion of further boreholes in August 2023, the logs were provided to Royal HaskoningDHV's Archaeological Consultant who undertook a desk-based Stage 1 geoarchaeological review which comprises a desk-based review. As described above, VC01A (acquired in 2021) contained a thin (0.10m) deposit of firm plastic dark grey to black slightly sandy pseudofibrous peat, containing leaf and twigs. The peat lenses were also recorded at the top of VC03. Medium, gravel sized peat pockets with a dark grey to black slightly sandy silt was identified in VCN08 2022. Due to the requirements of engineering and design objectives, these samples were not available for geoarchaeological recording, sub-sampling or analysis, however, the results from geotechnical investigations suggest that this deposit is not *in-situ*, but reworked and redeposited. It is concluded that no deposits of archaeological interest were identified for further geoarchaeological assessment.

4.2 Methodology for Further Assessment

Should any further geotechnical investigations be undertaken, it is recommended that geotechnical logs be made available for review by a specialist marine geoarchaeologist to undertake a Stage 1 geoarchaeological assessment comprising a desk-based review of the geotechnical logs.

Following Stage 1 assessment, a report should be produced setting out the results of the review and establishing requirements for a Stage 2 assessment. A Stage 2 assessment involves recording of any deposits with geoarchaeological potential identified, and an archaeological report would be submitted to HES for review and comment. The Stage 2 assessment will identify the scope of works for Stage 3 palaeoenvironmental assessment, and would include consideration on how the samples for Stage 3 will be taken, processed, and assessed and would be reviewed and agreed with HES prior to commencement.

5 Protocol for Archaeological Discoveries

5.1 Circumstances of Discovery

This PAD addresses finds of archaeological interest, should they be encountered during dredging activities.

5.2 Types of Discovery

Discoveries may comprise finds or seabed obstructions. Finds are categorised as:

- Wreck: all artefacts originating from a vessel in accordance with the legal definition of 'wreck' in the Merchant Shipping Act (1995) and which must be reported to the Receiver of Wreck;
- Non-wreck: cultural artefacts that present within terrestrial contexts and on the seabed as a result of having been lost on land, either at times of lowered sea-level or eroded from the shore; and
- Treasure: In Scotland, if an object is found that might be treasure, it must be reported to the Treasure Trove Unit at the National Museums of Scotland, a local museum or the local council archaeologist. However, the Scots common law right relating to found archaeological and historic items in Scotland (and dealt with through the system of Treasure Trove) does not extend to the marine environment except to the foreshore.

If discoveries comprise unexploded ordnance (UXO) then measures put in place by Forth Ports Limited will take precedence. Historic ordnance, however, may still be of archaeological interest and can still be reported under the PAD once UXO policy has been satisfied.

An obstruction, or 'site', on the seafloor may comprise previously undiscovered wrecks or fragments of wrecks, including aircraft, former port and harbour structures or the remains of other structures or installations.

5.3 Approach

The approach taken in implementing the PAD during the dredging works will follow industry standard guidance set out in the Marine Aggregates Industry Protocol for reporting finds of archaeological interest (BMAPA, English Heritage and Wessex Archaeology, 2005) and the Offshore Renewables Protocol for Archaeological Discoveries (The Crown Estate, 2014). This approach comprises the following structure:

- Awareness training provided to staff and contractors prior to works commencing;
- Discoveries are made on the seabed or on board a vessel;
- Staff / crew provide first aid to finds and record basic details of discovery;
- Discoveries are reported to the Retained Archaeologist who will provide initial advice and seek specialist advice as necessary;
- Measures to address the discovery are established by the Retained Archaeologist, in consultation with Forth Ports Limited and the Archaeological Curator, as necessary;
- Measures are implemented by staff / crew; and
- A summary report is provided to stakeholders by the Retained Archaeologist and a MIDAS Heritage compliant report is forwarded to national and local authority heritage data archives.

Roles are set out in **Section 5.4**.

5.4 Roles, Responsibilities and Communications

5.4.1 Forth Ports Limited

Forth Ports Limited will retain ultimate responsibility for implementing the PAD. Specific responsibilities will include:

- Securing the services of a Retained Archaeologist to facilitate the implementation of the PAD;
- Assigning staff to the key roles of Nominated Contact and Site Champions and ensuring their awareness of their responsibilities under the PAD;
- Ensuring the availability of staff / crew and contractors for toolbox talks; and
- Providing a report following the completion of activities to the Archaeological Curator to demonstrate adherence to the PAD.

Forth Ports Limited's dredging contractor will be responsible for the co-ordination and implementation of the PAD.

5.4.2 Retained Archaeologist

A Retained Archaeologist will be secured by Forth Ports Limited to facilitate the implementation of the PAD. Details of the Retained Archaeologist contracted by Forth Ports Limited to facilitate the implementation of the protocol are to be confirmed by Forth Ports Limited. The Retained Archaeologist will be responsible for:

- Arranging a briefing note and slides to be presented to staff at mobilisation to ensure awareness of the PAD and to provide guidance on the types of discoveries that may be encountered (if required);
- Providing initial advice to staff / crew in the event of a discovery;
- Undertaking an assessment of archaeological potential;
- Seeking specialist advice to inform the interpretation of discoveries, where necessary;
- Consulting with stakeholders (e.g., the Archaeological Curators) to agree proportionate measures to address discoveries;
- Producing summary reports and MIDAS Heritage compliant reports to disseminate data to stakeholders; and
- Ensuring that the Receiver of Wreck is informed in the event of discoveries of wreck material.

5.4.3 Nominated Contact

A member of staff from Forth Ports Limited or their construction contractor will be nominated to act as the single point of contact for all communications regarding archaeology. The Nominated Contact will be responsible for:

- Co-ordinating reports of discoveries from site champions and ensuring that appropriate 'first aid for finds' is carried out and that initial data is recorded;
- Reporting discoveries to the Retained Archaeologist and to the Receiver of Wreck, if required;

- Communicating appropriate measures to site staff as advised by the Archaeological Contractor; and,
- Ensuring that measures are implemented as appropriate.

5.4.4 Site Champion

The Nominated Contact will identify a Site Champion, or Champions as appropriate, to act as a single point of contact for staff on site. The Site Champion will be responsible for:

- Implementing a Temporary Exclusion Zones (TEZ) should a discovery be identified;
- Ensuring observation of the TEZ by all staff and contractors;
- Compiling Preliminary Record sheets for discoveries; and,
- Reporting discoveries to the Nominated Contact.

TEZs are detailed in **Section 5.5** .

5.4.5 All Staff / Crew and Contractors

On making a discovery all staff/crew and contractors have a responsibility under the terms of the PAD to:

- Safeguard finds:
 - Handle with care;
 - Leave marine growth, rust, sediment, or concretion intact; and
 - Undertake appropriate first aid measures, such as immersing waterlogged finds in seawater in a clean, covered container.
- Undertake initial recording:
 - Record the position of the discovery;
 - Photograph finds in the condition in which they were recovered;
 - Label finds with a unique ID number as advised by the Archaeological Contractor; and
 - Report the discovery to the Site Champion.

All staff and contractors also have a responsibility to observe mitigation measures agreed by Forth Ports Limited, with the Archaeological Curator such as the implementation of a TEZ at the location of a discovery.

5.5 Temporary Exclusion Zones

Archaeological Exclusion Zones (AEZs) are the principal means used to preserve heritage assets *in-situ*. There are currently no known heritage assets and no AEZs within the proposed dredge area.

In the event of a discovery of possible archaeological material, a TEZ would be implemented by the Nominated Contact if the position of an obstruction, anomaly, or find is known with reasonable certainty.

A TEZ precludes all activities from taking place in the vicinity of the obstructions, anomaly or find until further archaeological advice has been obtained.

Additional investigation may be required, which may include:

- high resolution geophysical survey;
- diver survey; or
- ROV survey.

If, following further investigation, it can be reasonably concluded that there is no important wreck or other feature present within the TEZ then it will be revoked. The TEZ may be formalised as an AEZ if:

- an important wreck or other site or feature is confirmed to be present on the seabed; or
- if Forth Ports Limited does not wish to undertake additional investigation to confirm the nature of the discovery.

The removal of a TEZ, or formalisation into an AEZ, will occur only following consultation and in agreement with the Archaeological Curator.

Where additional investigations are required, they will be subject to a separate method statement, with specifications to be agreed by Forth Ports Limited with the Archaeological Curator, as advised by the Retained Archaeologist. A report detailing the results of the investigation will be submitted to the Archaeological Curator to inform discussions concerning the removal or formalisation into an AEZ.

If archaeological remains are confirmed and it is not possible to implement a formal AEZ then, subject to agreement with the Archaeological Curator, Forth Ports Limited may implement alternative forms of mitigation such as a programme of recording and / or recovery these measures will be detailed in a method statement.

All investigative works will be set out in a detailed method statement that will be submitted to the curator for approval in advance of works commencing.

5.6 Reporting Discoveries

A flow chart illustrating the PAD as described below is included as **Appendix 1**.

Staff / crew or contractors making a discovery will report the find or obstruction to the Site Champion. If the discovery comprises an obstruction on the seabed, and the position is known, then intrusive works (dredging) will cease in the vicinity of this position and the position of the obstruction will be recorded. Works will not recommence in this vicinity of the position until archaeological advice has been obtained. The Site Champion will implement a TEZ and ensure observation by staff and contractors.

If the discovery comprises archaeological material, the position of the discovery should be recorded. This will be the position of the find itself, if known, or the position of the excavator at the time of the discovery. The find should be photographed in its discovery condition, including an appropriate scale in the photograph. If photographs are not possible then a drawing or other record may be used as an alternative.

Measures will be taken by staff to safeguard the find including first aid conservation:

- Marine growth, rust, sediment, or concretion should be left intact;
- Waterlogged finds should be immersed in seawater in a suitable clean and covered container; and

- Dry finds should be placed in a suitable container and stored in a cool, dark place.

The Site Champion will ensure that safeguarding has taken place and will compile a Preliminary Record (see **Appendix 2**) and pass this, along with any photographs, drawings, or other records, to the Nominated Contact.

On receiving the report of a discovery, the Nominated Contact will confirm the details of the Preliminary Report with the Site Champion and inform the Retained Archaeologists soon as possible. The Nominated Contact will ensure that all staff / crew and contractors that may be required to work in the area are aware of the discovery.

If the find is, or appears to be 'wreck', the Nominated Contact will, as soon as possible, notify the Receiver of Wreck in accordance with the Merchant Shipping Act (1995).

The Retained Archaeologist will advise the Nominated Contact of any further actions that may be required such as:

- Advice on first aid conservation or actions to be taken in respect of a find;
- Advice on the identification of finds and proposals to further evaluate discoveries; and
- Advice to prevent further impacts, such as the implementation of an exclusion zone.

The Retained Archaeologist will undertake an assessment of the archaeological potential of discoveries and will liaise with the Archaeological Curator, Forth Ports Limited, and other stakeholders as relevant, to agree measures to address the discovery. The Retained Archaeologist will advise Forth Ports Limited on any additional work required to stabilise, conserve or record recovered finds.

Following identification, evaluation, and the agreement of measures to address the discovery the Retained Archaeologist will compile a summary report for the discovery for distribution to stakeholders if required. A MIDAS Heritage compliant report to submit details of the discovery to national and local authority heritage data archives will also be produced.

5.7 Timing

Action will be taken immediately following a discovery so that the precise position of a discovery can be calculated and recorded (from the vessel track for example) and to minimise disruption to works.

Measures to safeguard finds, including the application of first aid conservation, will be implemented as soon as possible following discovery, in accordance with health and safety and practical requirements.

The initial record, including photographs, will be compiled, and forwarded by the Site Champion to the Nominated Contact on the same working day that the discovery is made.

On receiving the report, the Nominated Contact will report the discovery to the Retained Archaeologist on the same working day.

An initial response will be provided by the Retained Archaeologist to the Nominated Contact within two working days of receiving the initial report.

A timetable for implementing measures to address the discovery will be agreed following the initial response as appropriate to the archaeological interest of the discovery.

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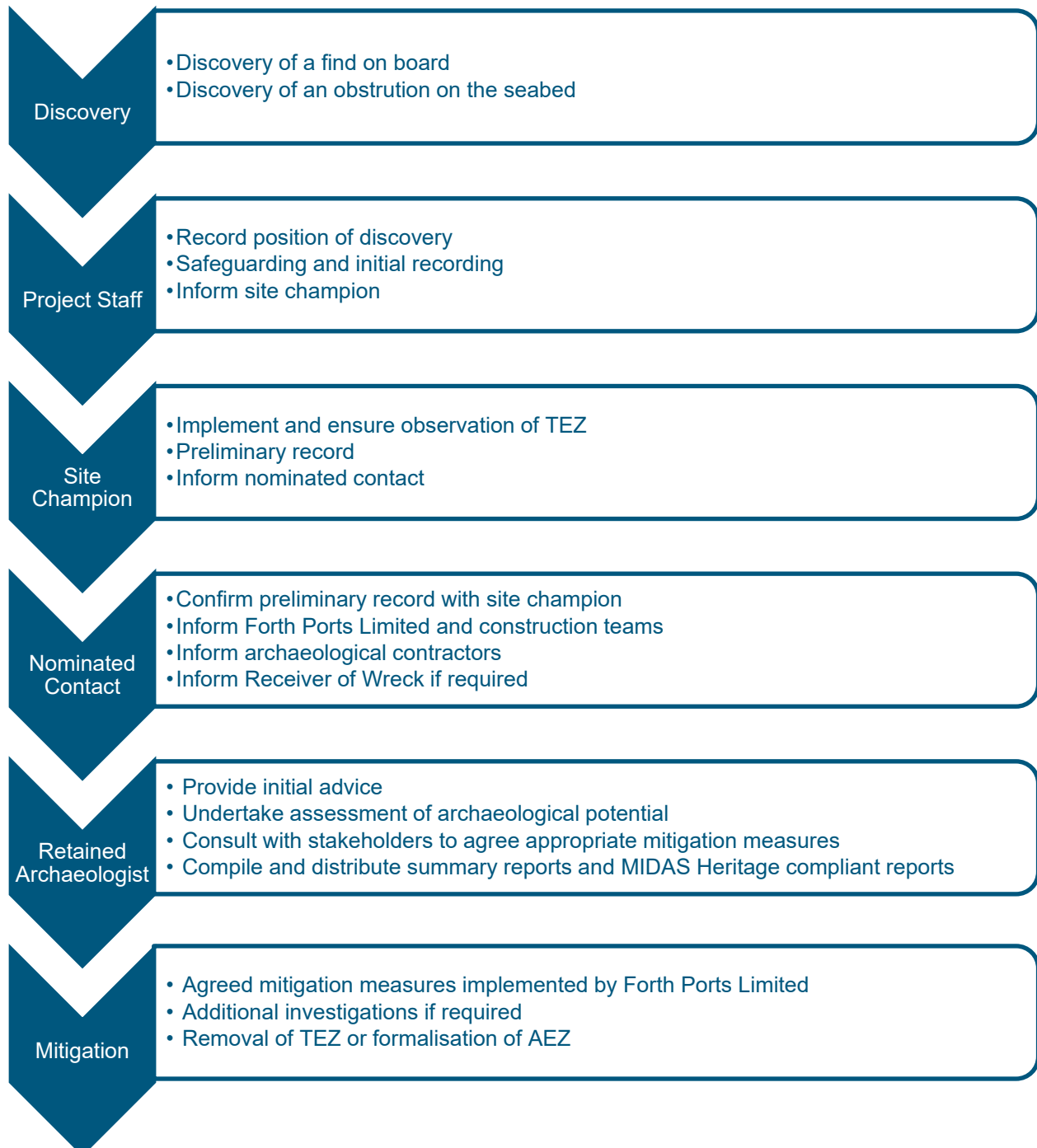
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Appendix 1: PAD Reporting Flowchart



Appendix 2: PAD Preliminary Record Form

Port of Leith Outer Berth Development Approach Channel Deepening Scheme Archaeological Discoveries Preliminary Record Form	
Finder Details	
Vessel/Team/Contractor Name:	
Work Package:	
Date:	Time of compiling information:
Name of compiler (Site Champion):	
Name of finder (if different to above):	
Discovery Details	
Time at which discovery encountered:	
Original position of discovery on seabed/inter-tidal/on land (if known):	
<ul style="list-style-type: none"> Latitude: 	
<ul style="list-style-type: none"> Longitude: 	
<ul style="list-style-type: none"> Datum (if different from WGS84): 	
Position of vessel:	
<ul style="list-style-type: none"> Latitude: 	
<ul style="list-style-type: none"> Longitude: 	
<ul style="list-style-type: none"> Datum (if different from WGS84): 	
Notes on accuracy of position:	
Description of the find/obstruction/anomaly:	
Size/extent:	

Details of finds recovered:

Details of photographs, drawings, or other records:

Details of treatment given to find(s):

Any other notes:

Date and time at which Nominated Contact informed:

Signed:

Date: