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Figures

Box 2 The FAIR Guiding Principles
To be Findable: F1. (meta)data are assigned a globally unique and persistent identifier F2. data are described with rich metadata (defined by R1 below) F3. metadata clearly and explicitly include the identifier of the data it describes F4. (meta)data are registered or indexed in a searchable resource To be Accessible: A1. (meta)data are retrievable by their identifier using a standardized communications protocol A1.1 the protocol is open, free, and universally implementable A1.2 the protocol allows for an authentication and authorization procedure, where necessary A2. metadata are accessible, even when the data are no longer available To be Interoperable: I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation. I2. (meta)data use vocabularies that follow FAIR principles I3. (meta)data include qualified references to other (meta)data To be Reusable: R1. meta(data) are richly described with a plurality of accurate and relevant attributes R1.1. (meta)data are released with a clear and accessible data usage license R1.2. (meta)data are associated with detailed provenance R1.3. (meta)data meet domain-relevant community standards

Figure one. The FAIR Guiding Principles from Wilkinson *et al.* (2016).

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Location Specific Written Scheme of Investigation for Construction Integrated Recording

1.1 Appendix 4 – Environmental Sampling

General sampling strategy

1.1.1 This sampling strategy sets out why, where, what, how and when in relation to sampling. Sampling will be targeted and focused and will be based on sound understanding of the nature of comparable archaeological remains both locally and regionally. It will also be flexible; allowing for an iterative approach as new information may be brought to bear as the project develops. In general, every context could be sampled for a range of environmental proxies. However, by developing a strategy that focuses on the likely remains to be preserved, and the ability of this material to provide pertinent archaeological information, this allows for targeted, site specific, and relevant samples to be taken. The strategy thus sets out a framework to guide the taking of samples.

- **Why** – samples will be taken to address the specific project aims and to help address [REDACTED], in order to recover dating evidence, understand the site and assess how it might have changed over time.
- **What** – what features are you actually going to sample to address those questions? The focus at [REDACTED] is on Roman riverside structures with potential for surviving timber elements, and on alluvial sequences. Relevant samples of wooden objects, and of vertical sediment sequences will be taken. ¹ Additional sampling techniques will be deployed as required, for example bulk sampling of discrete features in non-waterlogged contexts.
- **Where** – The position of the alluvial sequence sampling will be determined in consideration of geoarchaeological factors, and practical/safety factors. It is likely that a stepped section will be sampled, rather than a continuous vertical section, due to the anticipated depth of the excavations. Timber structures will be sampled on an as-and when required basis.
- **How** – Individual timber samples will be 3d located prior to removal. Timber recording sheets will be completed, detailing sample locations if the whole timber has not been recovered from site. Alluvial sequence

¹ Samples from waterlogged contexts will require storage in suitable conditions, to prevent deterioration. This may require the creation of temporary storage facilities on site, while longer-term storage is agreed. Advice from internal specialists should always be sought in these situations and any changes recorded within this template.

samples will be recorded in 3d and photographic, drawn and written records of sampling methods and locations will be made.

- **When** – at what stage in the work will the samples be taken? In some instances, a few early samples processed rapidly can help to refine the strategy later in the programme, particularly on large and complex sites.² This iterative approach, if integrated with the fieldwork, further helps refine and focus project resources.

1.1.2 During the archaeological mitigation, bulk samples taken from archaeological features across the site will provide information on a range of environmental proxies and the deposits in which they are found. Typically, these samples are taken for preserved seeds and charcoal but may also include; small mammal bones and fragments of larger bones; fish and bird bones; molluscs; hammerscale and other evidence of industrial processes and small finds. Evidence from bulk samples can indicate where particular domestic or industrial processes were taking place or highlight locations where disposal of different materials occurred.

1.1.3 At the recording stage, collection, processing and assessment of bulk samples will help to characterise the site. One key bit of information that comes from the samples relates to the archaeological preservation conditions, which need to be understood in order to further refine sampling methodology and provide information to shape the analysis stage of works.

1.1.4 Further analysis of samples from Construction Integrated recording will likely provide many of the key details about what was happening on a given site, including types of food eaten, the local environment and how spaces were used and managed over time.

1.1.5 Sampling to retrieve palaeo-economic/environmental evidence ('ecofacts') will comply to [REDACTED]

1. Key elements of sampling strategy for [REDACTED]

1.1.6 The Site has the potential for features associated with settlement and agricultural activity spanning the prehistoric through to the medieval period. The proximity of the mitigation area to the [REDACTED] and the adjacent floodplain also suggests that the following deposits will be present:

- Alluvial & peat sequences in the stream valley;
- Waterlogged timbers and other organic materials;

1.1.7 Sampling will be undertaken on relevant features, including those outlined above, taking into account advice from the Archaeological Contractor's

² Note that processing monolith and timber samples can be a drawn-out process and is not likely to happen quickly enough to inform site strategies. It is considered that expert advice on site at an early stage is the best way of refining the sampling strategy.

environmental archaeology team. This will ensure that samples are recovered from a representative range of contexts, which adequately characterise past activities on site and allow an assessment to be made of the extent to which they help address palaeoenvironmental and palaeo-economic questions.

- 1.1.8 Targeted sampling of sediment sequences within features may be undertaken for the recovery of undisturbed samples for more detailed sediment description and potential lab assessment e.g. soil chemistry, magnetic susceptibility or soil micromorphology. Although detailed lab work is usually carried out as part of post excavation analysis, it may be deemed appropriate to carry out some preliminary work as part of the Archaeological Recording stage, depending upon the perceived archaeological and chronological significance of the strata under investigation. Such decisions will be made by the Archaeological Contractor's geoarchaeology team.

2. Contractor's detailed sampling strategy for LSWSI on basis of [REDACTED] and previous knowledge of [REDACTED]

- 1.1.9 Based on the initial sampling strategy and background information (including geophysical survey / trial trenching), the following additional observations have been made based on past experience of this type of site, the local geology and topography, and from other similar sites in the vicinity.
- 1.1.10 The sampling strategy will be subject to revision in response to the nature of archaeological deposits encountered and the findings of palaeo-economic/environmental assessment conducted during mitigation. Sampling revisions will be undertaken by the environmental manager of Headland Archaeology (UK) Ltd in consultation with the project manager [REDACTED] the Employer and stakeholders.
- 1.1.11 Site visits by the environmental manager or other appointed specialists will be undertaken at appropriate stages of the mitigation, decided in consultation with the project manager. During site visits toolbox talks will be used to communicate to site staff revisions to the sampling strategy and the site-specific objectives of palaeo-economic/environmental research.
- 1.1.12 A review of information from desk-based assessment, trial trenching results and regional evidence indicates that the incidence of charred plant remains is expected to be low, and the incidence of animal bones is expected to be very low. There is low potential for the incidence of human remains including cremations, pre-Iron Age deposits, and significant features including burnt mounts.
- 1.1.13 Paleo-economic/environmental evidence has the potential to address other [REDACTED] identified in the Project Plan. These include plant and animal resource use, and how patterns in use varied across the region, by type of site and through time. There is also potential to retrieve palaeo-environmental evidence that indicates the nature of past environments, and how they were impacted by human activity, as well as

to explore the role of plant and animal resources in the formation of cultural distinctiveness and identity.

Block samples

- 1.1.14 Intact depositional sequences may provide information palaeoenvironmental or geoarchaeological information of significance. This is most likely to relate to the sequence of alluviation (deposition) and peat formation (stabilisation). Such sequences may be sampled through use of extracting a block of the section for lab-based assessment. These types of sample include column, monolith and Kubiena samples.
- 1.1.15 The size of the block sample required will be dependant on the particular sequence in question and will be decided in consultation with the Archaeological Contractor's geoarchaeology team. The emphasis will be to take samples across context boundaries.
- 1.1.16 The aim of block samples is to preserve the sequence intact, and every effort will be made to minimise disturbance of the deposit during sampling.
- 1.1.17 The position of block samples in section will be recorded on section drawings, photographed and geo-located by dGPS. Block samples will be clearly labelled with a unique sample number and the TOP of the block clearly indicated. The contexts captured by the sample will be recorded on the sample register.

Waterlogged wood

- 1.1.18 The mitigation area is expected to contain waterlogged structural remains, including a possible stream crossing point in the form of a wooden bridge supported by timber posts. Waterlogged wood has the potential to provide evidence on building technology, economy, industry, and resource use, as well as contributing to our understanding of the wider landscape.
- 1.1.19 Wood retrieval strategies should follow Historic England best practice guidelines (<https://historicengland.org.uk/images-books/publications/waterlogged-wood/waterlogged-wood/>). Any waterlogged timbers recognized on site will be carefully exposed and cleaned to allow for recording and identification.
- 1.1.20 Waterlogged wood will be primarily recorded on-site and not retained into post-excavation. Exceptional wooden remains, including artefacts (e.g. tools and implements) and well-preserved evidence of timber working (e.g. intact joints) may be retained into post-excavation. In these cases it may be necessary to cut timber on site to target only the relevant elements. Retention of wooden remains should be undertaken in consultation with Archaeological Contractor's environmental archaeology team and/or external specialist(s) in waterlogged wood. To reduce the risk of deterioration of wooden remains, the advice of a conservator should be sought soon after the decision to retain wooden remains.

- 1.1.21 The recording and handling of structural timbers and other worked wood should be informed by advice from a waterlogged wood specialists, which may be provided by site visits or virtually.
- 1.1.22 Timbers will be kept wet on site to reduce the potential for desiccation and wrapped for cold storage. Smaller examples may be wrapped and stored in self-seal bags for refrigeration. Samples will be taken for radiocarbon and dendrochronological analysis, if required. Bulk soil samples will be recovered from associated contexts.

Bulk samples

- 1.1.23 It is not anticipated that there will be significant palaeo-environmental/economic sampling through bulk (also known as whole-earth) samples. However, on higher ground within [REDACTED], there remains the potential for non-waterlogged discrete features to be present.
- 1.1.24 Bulk sampling will target secure, stratified contexts. Contexts containing dateable artefacts will be prioritised. Other contexts will be sampled to ensure adequate spatial and temporal sample coverage is achieved and to retrieve ecofacts suitable for radiocarbon dating.
- 1.1.25 Bulk samples will be primarily taken for a specific reason that is related to [REDACTED] or other relevant research objectives. Reasons for sampling may relate to feature- or period-specific enquiries as detailed below. All samples will be accompanied by a free-text comment from the sampler as to their motives for sampling.
- 1.1.26 The volume of samples will be typically between 20 and 40 litres, or 100% of the deposits if less, dependant on the type and context of the deposit being sampled.
- 1.1.27 Bulk samples targeting 'dry' deposits (in which the primary means of preservation of ecofacts is charring) will typically be 40 litres in volume, or 100% of the deposits if less than 40 litres. These samples will be processed by routine flotation.
- 1.1.28 Bulk samples targeting 'wet' deposits (i.e. deposits that appear to have been persistently wet since deposition and in which the preservation of organic remains by waterlogging is deemed likely) will typically be 20 litres in volume, or 100% of the deposits if less than 20 litres. The smaller sample size is warranted owing to the rich abundance of ecofacts in waterlogged deposits. Such samples will be marked as 'suspected waterlogged' on the sample register and sample tags. These samples will be reviewed by specialist staff before being processed by wet-sieving, if deemed appropriate.
- 1.1.29 Deposits of high significance may require larger sample sizes as deemed appropriate by the field team in consultation with Archaeological Contractor's environmental archaeology team. Scenarios requiring larger sample sizes include deposits of pre-Iron Age date and samples around human remains.

Larger samples would generally not be expected to exceed 60 litres, although 100% sampling may be appropriate in some special cases.

- 1.1.30 Both flotation and wet-sieving will use a minimum mesh size of 250 micros. After sampling remaining deposit material may be coarse sieved on site if there is reasonable potential for the recovery of small finds or animal bones.

3. Pre-ex / post soil removal revision / additions to the sampling strategy

Strategy relating to the Archaeological Excavation and Recording of Alluvium and Peat deposits at [REDACTED]

Regarding the sampling of archaeological deposits, paragraphs 19.4.6 and 19.4.7 within Appendix 4 of the LS-WSI [REDACTED] state:

The Site has the potential for features associated with settlement and agricultural activity spanning the prehistoric through to the medieval period. The proximity of the mitigation area to the [REDACTED] and the adjacent floodplain also suggests that the following deposits will be present:

- Alluvial & peat sequences in the stream valley;
- Waterlogged timbers and other organic materials;

Sampling will be undertaken on relevant features, including those outlined above, taking into account advice from the Archaeological Contractor's environmental archaeology team. This will ensure that samples are recovered from a representative range of contexts, which adequately characterise past activities on site and allow an assessment to be made of the extent to which they help address palaeoenvironmental and palaeo-economic questions.

This methodology outlined within Appendix 4 of the LSWSI is currently being undertaken by Headland Archaeology at [REDACTED], albeit in advance of construction works at the request of EKFB in order to minimise the potential impact of archaeological works upon construction programme.

Because of the nature and rich paleoenvironmental potential of the peat deposit, the following bespoke strategy is proposed by [REDACTED] and their Archaeological Contactor in order to maximise the recovery of paleoenvironmental evidence, without the requirement to excavate and recover the entire deposit:

- Metal detecting of the entirety of the deposit and marking of all signals identified during this process with the use of flags;
- Imposition of a 2 m2 grid across the entirety of the peat deposit (as per Figure 1) with sampling undertaken on alternating squares within this grid as follows:
 - o Monolith samples to be taken from cleaned sections for the recovery of waterlogged plant remains and other palaeoenvironmental proxies. Samples should incorporate the full sediment profile including the upper and lower boundaries of the peat. This may be accomplished utilizing appropriately sized monolith tins or a series of smaller overlapping kubiena tins where shallow deposits are encountered (<30cm).
 - o Accompanying bulk samples of up to 2 litres to be collected in 10cm spits through the full depth of the sequence;
 - o Spot samples to be collected at appropriate intervals for geochemical analysis, in order to investigate spatial patterns in industrial activities and other anthropogenic events such as manuring and waste management.

This strategy will provide information on past vegetation and site conditions and should allow for an investigation of how the peat accumulated and the nature of the relationship between this and any under and overlying archaeological deposits

Contingency is allowed for hand excavation of adjacent squares should the peat produce other remains of palaeoenvironmental significance or archaeological finds, such as leather. Following completion of archaeological hand excavation and recording the remainder of the peat will be machine excavated.

Should complex deposits or areas with a high density of palaeoenvironmental remains, for example waterlogged wood, be encountered, grid spacing should be reduced accordingly to allow for higher resolution sampling.

Samples will then be returned to a suitable facility for cold storage and targeted sampling of monolith and bulk samples will be undertaken at appropriate intervals for the recovery of waterlogged plant macrofossils, pollen, non-pollen palynomorphs (NPP's), diatoms, ostracods/foraminifera and insect remains. Selected samples may also be considered for soil micromorphology and a programme of radiocarbon dating will be implemented.

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N.B. please see supporting documents for redacted site WSI