

**Rhyl Central Coastal Defences Scheme:
Peat Investigation
Written Scheme of Investigation**

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Written Scheme of Investigation for peat investigations

1. BACKGROUND

1.1. Introduction

- 1.1.1. York Archaeology (formerly Trent and Peak Archaeology) have been commissioned by Mott Macdonald on behalf of Balfour Beatty to undertake archaeological investigations of peat deposits as part of the Rhyl Central Coastal Defence Scheme, Rhyl, Denbighshire (from NGR SJ 02004 82431 to SJ 00230 81326, Figure 1), following the results of earlier geoarchaeological monitoring and deposit modelling (YA, 2022a).
- 1.1.2. The Scheme runs along the coastline of Rhyl, from Splash Point at NGR SJ 02004 82431 to the play area at NGR SJ 00230 81326. The Scheme area includes the beach and the existing promenade and coastal defences, which consist of hard engineered structures constructed from the 1950's onwards. These comprise a series of stepped revetments, recurve walls and vertical walls. There are also a number of groynes extending out from the defence structures.
- 1.1.3. A desk-based assessment of the scheme has been carried out (CPAT 2018) with an addendum produced by Mott Macdonald (2021), included in an Environmental Statement produced (JBA 2018). A geoarchaeological project design was been provided (Mott MacDonald 2021a) alongside a Ground Investigation (Mott MacDonald 2021b) report. In addition, a WSI was produced for the deposit modelling component of the project (TPA 2021) followed by subsequent reporting of geoarchaeological monitoring and deposit modelling (YA, 2022a).

1.2. Planning conditions/context

- 1.2.1. This Written Scheme of Investigation details a proposed scheme of geoarchaeological test pit survey (Figure 2). The scope of work has been designed following consultation with Clwyd-Powys County Council Planning Archaeologist. The work is required under the Environmental Impact Assessment (EIA) Screening and Scoping opinion request from Denbighshire County Council (DCC). Clwyd-Powys Archaeological Trust (CPAT), the archaeological advisers to the council, have recommended that a palaeoenvironmental deposit model be produced for the length of the Scheme.
- 1.2.2. The overarching legislation in relation to the historic environment in Wales is provided by:
- Historic Environment (Wales) Act 2016
 - Planning (Wales) Act 2015;
 - Town and Country Planning Act 1990; and,
 - Planning (Listed Buildings and Conservation Areas) Act 1990.

Planning Policy Wales (PPW) 2017, updated 2018

- 1.2.3. Planning Policy Wales (PPW) considers the importance of the historic environment in planning and development and sets out the government's policies regarding development that affects the historic environment. It requires that proposals are fully evidenced and assessed to help informed decision making. Chapter 6 outlines these policies. The following paragraphs are relevant to archaeology:

- Paragraph 6.1.7 states that the planning system should protect, conserve and

enhance the significance of historic assets. Any change that impacts on an historic asset should be managed in a sensitive and sustainable way

- Paragraph 6.1.9 states that any decisions made through the planning system must fully consider the impact on the historic environment and on the significance and heritage values of individual historic assets and their contribution to the character of place

Paragraphs 6.1.23-27 specifically consider archaeological remains:

- Paragraph 6.1.26 states that where archaeological remains are known to exist, there should be sufficient information to allow a full understanding of the impact of the proposal on the significance of the remains.
- Paragraph 6.1.27 states that where archaeological remains are affected, there must be appropriate and satisfactory provision for their recording and investigation

Technical Advice note 24: The Historic Environment (2017)

- 1.2.4. TAN 24: The Historic Environment has been produced to provide guidance on how the planning system considers the historic environment during decision making on planning applications.

Denbighshire Local Plan 2006 to 2021 (Adopted June 2013)

- 1.2.5. The Local Plan is part of the statutory development plan for Denbighshire, the document will guide new development in the area until 2021. Archaeology is dealt with under the theme “Valuing our Environment”, but there are no specific policies which deal solely with heritage.
- 1.2.6. DCC are also in the process of updating their local plan (schedule to run between 2018 - 2033) and the preferred strategy was published in May 2019. The 2006 to 2021 plan remains current until the replacement plan is adopted. One of the objectives for the replacement LDP is to protect, enhance and sustainably develop Denbighshire’s built and historic assets.

Development details

- 1.2.7. The aim of the Scheme is to repair and improve the defences along the Central Rhyl coast. A variety of coastal defence solutions will be employed across the Scheme. The defences will run broadly east-west and the following coastal works have the potential to impact on archaeological deposits:
- Rock armour scour protection is proposed to be added to the defence toe to manage scour and prevent undermining and failure of the defence. This will be along the eastern section of the Scheme, broadly between Splash Point and Rhyl Events Arena and will be approximately up to 8.5m wide (seawards from the toe of the existing buried revetment / seawall); and
 - A stepped revetment, consisting of precast concrete will be placed over the existing stepped structure to dissipate wave energy and prevent erosion at the revetment toe. This will be along the western section of the Scheme, broadly between Rhyl Events Arena and the play area at Drift Park. The toe of the proposed revetment will be between 16m and 27m from the edge of the existing promenade (extending over the existing beach and buried revetment).

- Other works along the western section include raising the promenade, new rear seawalls with flood gates for access points, new retaining structures and new access onto the raised promenade.
- 1.2.8. The work is required under the Environmental Impact Assessment (EIA) Screening and Scoping opinion request from Denbighshire County Council (DCC). Clwyd-Powys Archaeological Trust (CPAT), the archaeological advisers to the council, recommended that a palaeoenvironmental deposit model be produced for the length of the Scheme. The model targeted the area of the beach which will see the most ground reduction or compression impacts, which will generally coincide with the toe of the proposed new rock revetments. Other areas where the surface of the beach below the present sand cover may be impacted, e.g. for heavy vehicle tracking, were also targeted.

Scoping Option

- 1.2.9. An EIA screening and scoping opinion was submitted to Denbighshire County Council in February 2021 (Application Ref: 45/2021/0092), with a response received on 26th April 2021. It was agreed that impacts on cultural heritage assets should be scoped in. CPAT also had a list of recommendations as part of the cultural heritage assessment, specifically related to the requirement of a palaeoenvironmental deposit model:
- The sub-surface potential for significant prehistoric deposits consisting of past land surfaces, peat deposits and prehistoric forest remains should be assessed by the provision of a palaeoenvironmental deposit model along the length of the scheme. Geoarchaeological specialists should be engaged to complete this model using appropriate techniques, which may include test pits, boreholes and/or geophysical survey. The geoarchaeological specialists will be responsible for designing the methodology, completing the evaluation works and reporting with suggested mitigation options. Mitigation may require additional sampling/excavation/survey or monitoring prior to, and during, construction works;
 - The palaeoenvironmental deposit model should target the area of the beach which will see the most ground reduction or compression impacts, which will generally coincide with the toe of the proposed new rock revetments. Other areas where the surface of the beach below the present sand cover may be impacted, e.g. for heavy vehicle tracking, should also be targeted;
 - If any geotechnical test pitting or cores are proposed to inform the EIA, or at any subsequent stage prior to construction, then they must be observed via a watching brief process by a qualified archaeological contractor. The findings should be reported, and the information should be shared with the geo-archaeological specialists, who may also wish to be present during GI excavations;
 - The archaeological contractors and geoarchaeological specialists involved in the above works should forward a WSI (written scheme of investigation, sometimes called a specification) to me [the archaeological adviser at CPAT] prior to commencing any assessment so that the methodologies can be approved; and
 - There should be full reporting and archiving of all aspects of the assessment work in accordance with ClfA standards and guidance. Normally the digital archive will be sent to the HER [Historic Environment Record] at CPAT and the National Monuments Record, RCAHMW. Finds will be archived at a regional museums service, or with the National Museum of Wales.

- 1.2.10. Following completion of geoarchaeological monitoring of GI works and deposit modelling (YA, 2022a), an area within the impact area of the proposed scheme was identified within which there were both surface and sub-surface deposits of peat. These peat deposits demonstrated the presence of in-situ preserved prehistoric human footprints. In addition, extant wooden structures of uncertain age were identified on the foreshore. Further investigation was deemed necessary to better characterise the peat deposits, as well as preserved archaeological remains.

2. GEOLOGY AND TOPOGRAPHY

- 2.1.1. The Scheme runs along the coastline of Rhyl from Splash Point at NGR SJ 02004 82431 to the play area at NGR SJ 00230 81326 (Figure 1). The Scheme area includes the beach and the existing promenade and coastal defences, which consist of hard engineered structures constructed from the 1950's onwards. These comprise a series of stepped revetments, recurve walls and vertical walls. There are also a number of groynes extending out from the defence structures.
- 2.1.2. The underlying bedrock of the site as mapped by the British Geological Survey is the Kinnerton Sandstone Formation, formed between 252.2 and 247.1 mya in the Triassic. This is overlain by Marine Beach Deposits- Sand and Blown Sand, most likely reworked in the Holocene.
- 2.1.3. At the western end of the scheme is the mouth of the River Clwyd and at the eastern end lies the Dee Estuary which drains into the Liverpool Bay (the bay of the Irish Sea between NW Wales to the east of the Irish Sea). The area was connected to the Isle of Man as part of a now submerged palaeolandscape. With the onset of the Devensian glaciation the area was buried beneath the ice until the after the Last Glacial Maximum when the climate began to ameliorate sending the glaciers into retreat.
- 2.1.4. The Marine Beach and Blown sand deposits represent more recent reworking of sediments and overlie extensive areas of peat and drowned forest. These peat deposits are periodically exposed, often following high energy storm events which strip the beach sands from the surface of the peat. A number of archaeological artefacts and mammalian remains have been recovered from these peat deposits, ranging from the Mesolithic to the Bronze Age. In addition, footprints are often recorded in such deposits with examples at Splash Point in Rhyl and Formby recording both human and animal prints. Also recovered from the Rhyl deposits is a red deer antler mattock dating to the Mesolithic 5640 to 5360 cal BC (OxA-1009:6560 ± 80 BP, Bell 2007).
- 2.1.5. However, despite frequent observations and larger studies, the extent and date of the submerged landscapes are still only partially understood. The expected sequence of these deposits around Rhyl is based on a study undertaken by Bell in 2007. This collated the known information and observations on the prehistoric land surfaces. The sequence established by Bell is as follows (from latest to earliest):
- Estuarine sediments;
 - Upper peat with submerged forest, including oaks, deer and aurochs prints;
 - Estuarine sediments with human and deer prints, possible context of Mesolithic mattock and polished axes;
 - Lower peat and submerged forest of willow, possible context of flint artefacts reported in 1924;
 - Estuarine sediments; and

- Boulder Clay

- 2.1.6. Work has been recently undertaken as part of the Rhyl East Coastal Defence Scheme, which has helped to further refine the sequence. This sequence is not closely dated; however, the Lower Peat Deposit, associated with a mattock, returned an age determination of 7600-7300BP. The base of the Upper Peat Deposit is dated to 6000-5500 BP, with the top of this layer dated to 1800-1200 BP. Analysis of the submerged land surfaces there has revealed a complex terrain, with evidence for submerged forests and palaeochannels. It has also been noted that archaeological and biological material is potentially associated with the estuarine clays as well as the peat.
- 2.1.7. The recent geoarchaeological monitoring and deposit modelling (YA, 2022a) confirmed glaciogenic sediment located primarily to the easternmost portion of the proposed sea defence extension, composed of glacial diamicton and a grey-brown gravel which was likely deposited by a high-energy subglacial meltwater channel. The subsequent estuarine sediments identified by Bell (2007; section 2.1.5) were not recorded. Overlying the glaciogenic sediment were two discrete deposits of peat, separated by grey silty clay. The uppermost of these two peat deposits was locally encountered at the present-day surface of the Rhyl foreshore. These two peat deposits correspond to the two peat deposits identified by Bell (2007; section 2.1.5).

3. ARCHAEOLOGICAL BACKGROUND

- 3.1.1. The following background is taken from the geoarchaeological monitoring and deposit modelling report (YA, 2022a):

Prehistoric period

- 3.1.2. Rhyl beach, particularly in the area around Splash Point, has been the site of many finds of Mesolithic to Bronze Age; the large majority of which were discovered during the first half of the 20th century. By the 1950's this collection encompasses over seventy prehistoric items of bone, bronze, stone and shell which were all recovered from the foreshore (Manley, 1988).
- 3.1.3. Of these finds, of particular note was a perforated antler mattock, discovered in 1910 though not assigned to any specific context, which was subsequently radiocarbon dated to 5640-5360 cal BC. Beyond the antler mattock, three Neolithic polished stone axes were recovered from the beach, with these being later interpreted as originating from the estuarine clays. Further Bronze Age remains were recovered unstratified from the beach in the form of a bronze chisel and socketed spearhead; of which the spearhead has been noted "to now be lost" (Manley, 1988 pp.4). Further unstratified finds from an undetermined period consisted of pebbles with hourglass perforations, two perforated stone possible net-sinkers, a perforated oyster shell, and a collection of bones which included both wild and domestic species (Bell, 2007).
- 3.1.4. Evidence for human activity has been recorded along the modern foreshore and occasionally from within the sediments associated with the peat/clay silts outcropping on the beach. These finds range in date from a Mesolithic antler mattock to a variety of finds of Neolithic or Bronze Age date. Significantly some of these finds have been made in the estuarine blue clay underlying the forest beds. These deposits have also produced mammal remains including red deer (including a full set of unshed antlers), roe deer, ox, horse, sheep, pig, badger, fox, wolf and whale. In addition, animal and human footprints have been recorded in the underlying clays.
- 3.1.5. Exposed peat on the Rhyl foreshore was recorded as containing numerous deer footprints,

together with a trail of five aurochs prints. Underneath this exposure, the peat was underlain by estuarine silts (section 2.3.3) in which were two or three poorly preserved footprints of humans together with deer prints (Bell, 2007). The remains of large trees were noted and form part of the extant remains of the ancient submerged forest.

- 3.1.6. Several short roughly parallel trenches filled with large flat stones and a series of upright wooden posts are located on the foreshore near Splash Point. These are as yet undated and are described by the CPAT (Clwyd Powys Archaeological Trust) regional historic environment record in the online Archwilio database as being “apparently dug through peat deposits exposed on Rhyl beach” (CPAT ref no. 123322). These are speculated to possibly be part of redundant sea defences or fish traps. As part of the same historic environment record, large wooden posts are located close to the trenches (though unrelated) and are possibly the remains of older groynes.

Roman

- 3.1.7. The evidence for Roman activity in the area is less well evidenced and comprises a small number of Roman coins recovered from the beach (PRN 102176), on Marsh Road (PRN 102177) and at Rhydwen Drive (PRN102182).

Medieval Period

- 3.1.8. Although there are documentary references to Rhyl dating back to the 14th century, these probably refer to an area rather than a settlement as such. The early form of the name is thought to be 'Hull', translatable as 'hill', and perhaps referring to the collection of low sandbanks here, raised a little above the level of the low ground which was in the past subject to flooding in high tides. Until the beginning of the 19th century the area seems to have contained only a handful of scattered farms and cottages.

Post-Medieval

- 3.1.9. A Bill was passed in 1794 authorising the construction of a sea defence and land drainage channels to control flooding. Rhyl was the earliest of the North Wales coastal resorts to develop. Growth of the town began in the late 1820s with the building of two hotels and a number of lodging houses. By the time of the Tithe survey in 1839, a number of roads had been set out, but there were very few new buildings. Large areas of common still survived on the land nearest to the sea. Inland, there was much arable land and with a large number of strip fields and quilllets and some of these were visible along the southern edge of the Study Area.
- 3.1.10. Rhyl Pier, built in 1867, was the first pleasure pier to be constructed in north Wales. The pier's Grand Pavilion, built in 1891, housed the world's largest organ, known as the Grand Jubilee Organ and weighed 25 tonnes. The first filmmaker to be based in Wales, Arthur Cheetham, presented his 'living pictures' to a packed Grand Pavilion in 1898. A series of incidents throughout the 19th century including boats crashing into the pier and the fatal performance of celebrity diver Tommy Burns precluded it's eventual dereliction by the 20th century. The pier was purchased by Rhyl Council in 1913 and refurbished; remaining open until the mid-1960s when it was declared unsafe and closed. The pier was subsequently demolished in March 1973.
- 3.1.11. It is also evident that the depiction of the seafront on the Tithe map is some 140m further inland than the present front, which has undergone considerable redevelopment, particularly for the leisure and tourism industry. Royal Alexandra Hospital along Marine Drive was used for the care of wounded soldiers during the First World War and German prisoners of war were recorded at Rhyl, and were possibly accommodated in a camp there, in the years after the Second World War.

4. AIMS AND OBJECTIVES

4.1.1. The overarching aims of the work are to:

- To record in greater detail the extent of surface and sub-surface peat deposits;
- To accurately identify and record archaeological remains present on the present-day foreshore, to determine the chronology and function of the wooden structures and to identify the potential for the site to preserve lithic remains;
- To understand the human and animal footprints in the context of those studied in detail at Formby and Happisburgh, to determine number of individuals and provide chronological data for human exploitation/visitation of the wetland;
- To determine the depositional sequence and palaeoenvironmental potential of organic deposits in the context of the work carried out at Splash Point, focusing on the macrofossil/insect and wood assemblages.

4.1.2. The main objectives of the work are:

- To undertake a rapid laser scan survey of the surface exposures of peat on the present-day foreshore to create an overall plan and 3d model of the footprints, wooden structures and peat surface;
- To make a full record of any human and animal footprints present on the peat surface;
- To undertake a hand auger survey within the areas previously identified as having peat present in order to target areas for potential test pitting, if a hand auger is unsuitable a window sample rig may be deployed;
- To undertake a test pit survey for the recovery of bulk samples for the recovery of artefacts (mainly lithics, animal bone etc);
- To record machine-excavated sections alongside each wooden structure. The timbers from each structure will be recorded and sub-sampled on site to recover toolmark, species identification/ring count data and provide samples for radiocarbon dating;
- To recover further samples to enable palaeoenvironmental assessment using either the hand auger/window sample rig or small test pit open sections;
- To undertake palaeoenvironmental assessment of organic deposits, focusing on macrofossil and insect assemblages;
- To update the existing deposit model with the results of the hand auger survey.

4.1.3. All recording will result in 'the preparation of a report and ordered archive', in line with the guidelines of the CIfA Chartered Institute for Archaeologists (2020a, 2020b, 2020c). In addition, the work will conform to the Historic England *Guidance for Deposit Modelling and Archaeology* (2020). The work will also conform to the Environment Agency's *Cultural Heritage Minimum Technical Requirements* (EA 2015).

4.2. Research Questions

4.2.1. The West Coast Palaeolandscapes survey identified the area around Rhyl as having a high potential for preserving archaeological deposits (Fitch and Gaffney 2011). In addition, prior to the geoarchaeological monitoring and deposit modelling (YA, 2022a), the Archaeological Coastal Forum Group recommended a series of aims for mitigation concerning the foreshore, for which that project would meet the principal aim (highlighted below):

- The presence of peat beds and submerged forests should be identified at the outset of the project;
- Coastal monitoring should be undertaken over a period of at least 6 months to observe and define possible extents of peat beds and submerged forests, with the results feeding in to the design of the development or coastal defences scheme;
- In all cases where intertidal development is proposed, it is recommended that some form of detailed geophysical survey of the sea bed is carried out at the early design stage of identify wreck sites or the presence of fish traps;
- Where possible, structures to be constructed on the foreshore should be designed to avoid impacting upon these deposits, or minimising any impacts;
- **Prior to the commencement of development, a scheme of archaeological evaluation of the deposits should be undertaken. This could include observation of the exposed surfaces of any peat beds and initial assessment of tree stumps (identification of species and assessment for suitability for dendrochronology dating). A number of test pits should be excavated through the peats, where they will be impacted upon, to obtain palaeoenvironmental evidence for assessment. Radiocarbon dates should be obtained at this stage;**

4.2.2. The subsequent geoarchaeological monitoring and deposit modelling (YA, 2022a) demonstrated that peat was present within the easternmost portion of the survey area, close to Splash Point. It also demonstrated that archaeological remains were present. Therefore, the contingency aims provided by the Archaeological Coastal Forum Group became relevant:

Contingency aims

- Should significant remains be identified, such as artefacts or footprints, a scheme of detailed recording should then be implemented. This would include further palaeoenvironmental sampling. Alternatively, this information may indicate that redesign of the proposals would be appropriate;
- Full assessment of the palaeoenvironmental and dendrochronology samples should then be undertaken, preferably before or during the construction phase in order that if highly significant information is revealed, further sampling can be undertaken; and
- Full reporting and archiving of all results.

5. METHODOLOGY

All fieldwork will be carried out in accordance with ClfA Standard and Guidance for an Archaeological Field Evaluation (ClfA 2014b) and Code of Conduct (ClfA 2014a).

5.1. Laser scan survey and footprint recording

- 5.1.1. A rapid laser scan survey of the deposit will be carried out to capture the detail of the peat surface, the footprints, and the wooden structures prior to excavation. This survey may be supplemented by photogrammetry. The scanning will follow the Historic England guidance for *3D Laser Scanning and Heritage* (HE 2018) and *Metric Survey Specifications for Cultural Heritage* (2015d).
- 5.1.2. The scan will be used to create an overall site plan, including the locations of the wooden structures and a 3-dimensional model of the area. The entirety of the peat deposit will be recorded to a resolution of $\leq 2\text{mm}$ point spacing.
- 5.1.3. A series of overlapping scans will be recorded to minimise data voids. The individual scans will be registered together using control targets. Targets will be tripod-mounted above temporary ground control points. The ground control points will be recorded using a Leica GNSS to enable georeferencing of the data set and to create a fully georeferenced point cloud saved in .e57 format with metadata adhering to ADS guidance for best practice (ADS 2019).
- 5.1.4. Footprint recording will follow the methods established by Burns *et al.* (2022). Footprints will be measured for length and width, and photographed. Dedicated recording sheets will be utilised as developed by Burns *et al.* (2022) in their supplementary information. The location of the footprint will be located using a GNSS. A geolocated squared grid will be laid out and the footprints within each sedimentary layer will be planned and scale drawings produced. Sufficient photos will also be recovered for a photogrammetry survey.

5.2. Hand auger survey

- 5.2.1. A hand auger survey array will be established within an approximate investigation area of 80m x 80m using an Eijkelpomp gouge auger (Figure 2). This array will consist of eight transects at ten metre intervals, with a total of up to eighty cores. Deposits are expected to be shallow, therefore core intervals may be refined on site to investigate microtopographic features. The auger sample points will be located and recorded using a GNSS. If it is not possible to record and recover the peat using a hand auger, then a window sample rig will be used with a wider transect interval of 20m.
- 5.2.2. The lithology will be recorded by a geoarchaeologist using the Troels-Smith system of sediment classification (1955). The scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers are darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Sicc) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955, Appendix 1) and a stratigraphic breakdown of the deposits will be recorded on proforma log sheets. The logs will be supplemented by digital photography.
- 5.2.3. If appropriate deposits are encountered (i.e. peats or estuarine silts) these will be recovered at measured intervals using either a Russian auger or the window sample rig to recover a continuous sequence. The work will be carried out by a geoarchaeologist using standard methods and following Historic England *Guidelines for Environmental Archaeology and Geoarchaeology* (2015a and 2015b).

5.3. Wooden structure excavation

- 5.3.1. A machine excavated section will be undertaken alongside each of the two wooden structures identified during the geoarchaeological monitoring and deposit modelling (YA, 2022) to allow the timbers to be recorded in section. Timbers will be recorded by a wood specialist and sub-sampled on site and adhere to the Historic England Guidance for *Waterlogged Wood* (2015c). Timbers not considered worthy of conservation or further work will be discarded on site once recording has been carried out, and discard will be carried out by the wood specialist. Samples will be recovered for dendrochronological (where appropriate) and radiocarbon dating (to bark edge/sapwood), species identification, and ring counts. If possible, the sections will also be laser scanned.
- 5.3.2. Should horizontal or jointed elements be encountered these will be hand-cleaned and further hand-excavated in plan with additional sections as be required. If intact wattwork is encountered this will be hand excavated rapidly to prevent deterioration of the structure. Wattle will be recorded on pro forma wattle group sheets with a representative subsample recovered from a range of diameters and all worked ends retained.
- 5.3.3. All timbers will be recorded and assigned context numbers which will be affixed to the timbers with nails and Tyvek labels. Once the locations are recorded the timbers will be removed for recording on site using pro-forma wood sheets by a wood specialist. All timbers will be photographed and a sub-set will be selected for hand illustration/photogrammetry. A sawn cross-section of each removed timber will be taken to allow for species identification and ring counts. All retained wood and species identification samples will be stored in acid-free finds bags with a small amount of water to provide temporary storage.

5.4. Test pit survey

- 5.4.1. The hand auger survey results will be used to demine the extent, location and number of test pits to be hand excavated across the peat deposit. The test pit locations will also be determined by the 15m exclusion zone which will be set out on site by the client. It may be necessary to carry out some test pits up to 5m beyond the exclusion zone in case of any scheme design changes. Any changes to the boundary of the site will be discussed with the client and County Archaeologist.
- 5.4.2. These will be recorded on proforma sheet, photographed and located using GNSS. Bulk environmental samples will be recovered at measured intervals for the recovery of insect and plant remains. Column samples may also be recovered should variations in the deposit be encountered.
- 5.4.3. If lithic scatters are encountered these will be excavated is possible with reference to guidance laid out in the draft Historic England Guidance *Managing Lithic Scatters* (HE 2019). Bulk samples will be recovered to be processed for the recovery of artefacts, including lithics, taken a measured intervals through the deposits in each pit.
- 5.4.4. If archaeological features are encountered the test pit will not be progressed further and where possible features will be excavated in such a way as to determine the stratigraphic sequence within each pit. If it is safe to do so, features will be hand-cleaned and planned. Features will be sample excavated sufficient to determine their plan and form, and to recover any datable artefacts.

- 5.4.5. All finds of medieval date or earlier will be recorded three dimensionally, or at a minimum by context/spit. Post-medieval finds or abundant redeposited structural material will be recorded by context/spit.
- 5.4.6. In the event of the discovery of human remains disturbance will wherever possible be avoided. Where removal is deemed necessary following discussion with, and the approval of, the client and the Archaeological Advisor, the necessary burial license will be obtained in line with the current Ministry of Justice procedures. The excavation of any human remains will be carried out in accordance with *Updated Guidelines for the Standards for Recording Human Remains* (Mitchell and Brickley 2017).
- 5.4.7. In the event of the discovery of any artefacts which constitute Treasure, these artefacts will be archaeologically removed to a safe location and reported to the coroner within 14 days in accordance with the procedures of the Treasure Act 1996 and the Code of Practice 1997. All treasure should be reported to the Finds Liaison Officer.
- 5.4.8. Sections of all features, where possible, will be drawn on drafting film in pencil at a scale of 1:20/1:50, and will show at least: context numbers, all colour and textural changes, levels expressed as O.D. values. Digital photos of each context will be taken together with general views illustrating the principal features of the excavations.
- 5.4.9. Written records will be maintained as laid down in the YA recording manual (YA, 2022b).

5.5. Post excavation

- 5.5.1. All finds will be cleaned, conserved, marked and stored as recommended in 'First aid for finds' (Watkinson & Neal 1998, United Kingdom Institute for Conservation), and marked with the site and find codes, and relevant accession numbers. These will be deposited with appropriate repository on completion of the report.
- 5.5.2. Palaeoenvironmental assessment, alongside scientific dating methods, will be undertaken following fieldwork completion. This assessment will focus on macrofossil and insect assemblages, with a small number of microfossil samples also potentially being incorporated. Samples will be submitted for radiocarbon dates from single entity macrofossils or bark sapwood where possible, following Historic England guidance for *Radiocarbon Dating and Chronological Modelling* (HE 2022).
- 5.5.3. Laser scan data will be processed in order to create report illustrations alongside the creation of 3-D models for future reference and dissemination.
- 5.5.4. Results from the auger survey will be incorporated into the pre-existing geoarchaeological deposit model (YA, 2022) to provide an updated deposit model, following Historic England Guidance for *Deposit Modelling and Archaeology* (HE 2019). Outputs could include sections, fence diagrams and solid models. Additional surfaces may be produced in QGIS. Data will be stored in an excel spreadsheet.

5.6. Project Staffing

- 5.6.1. Geoarchaeologists will be fully qualified and experienced (CVs can be supplied upon request).
- 5.6.2. The project will be undertaken and managed by Kristina Krawiec (YA Head of Geoarchaeology). Footprint recording will be led by Dr Alison Burns (University of

Manchester). Hand operated auger survey will be co-investigated with Dr Martin Bates (Freelance geomorphologist).

5.7. Reporting and Liaison

5.7.1. A post-excavation assessment report will be produced which will discuss the fieldwork results, present the updated deposit model, and include the palaeoenvironmental assessment. The report will reference to the Splash Point assessment and will make recommendations for final reporting with a view to integrate the two investigations. The report will summarise the suite of deposits, the archaeological remains, and consider their significance within the region. In addition, recommendations for publication will be proposed, if applicable.

5.7.2. Copies of the report will be provided to:

- The client.
- CPAT.

5.7.3. The report will include:

- Non-technical summary
- Introductory statement
- Aims of the project
- Methodology
- An objective summary statement of results
- Conclusion
- Illustrations at appropriate scales, all to include levels tied to Ordnance Datum which will include a detailed location map, detailed site plan showing GI locations, deposit model transect, and surfaces with map, screen grabs from the laser scanning.
- Index to archive and details of archive location; confirmation of archive transfer arrangements including a provisional timetable for deposition.
- References
- A copy of the OASIS form

5.8. Archive

5.8.1. All data used to undertake the deposit model (including raw data, the interpretation of those data and the outputs from the model) will be deposited with a suitable digital archaeological repository (e.g. the Archaeological Data Service) in a suitably accessible format to allow future work in the area to use and build on it. This should include borehole logs, spreadsheets of interpreted stratigraphic units including XYZ information and resultant GIS files of various deposits and surface parameters. A digital copy of the report will also be sent to the HER at CPAT (via <https://cpat.org.uk/heddos.html>) and the NMR, RCAHMW. The archive will be submitted within 4 weeks of completion of the report.

5.8.2. The digital archive where appropriate will conform with standards outlined in:

- Management of Research Projects in the Historic Environment MoRPHE (HE 2015);
- Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation (AAF 2011);
- ClifA's Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (2020c);
- Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs) (Welsh Archaeological Trusts 2018);

- RCAHMMW Guidelines for Digital Archives (Edwards 2016);
- Archaeological archive deposition policy in Wales (National Panel for Archaeological Archives in Wales 2017);
- Deposit Modelling and Archaeology. Guidance for Mapping Buried Deposits (Historic England, 2020);
- Archaeology Data Service (ADS 2020) How to Deposit.

5.9. Copyright

- 5.9.1. York Archaeology shall retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents Act 1988 with all rights reserved excepting that it hereby provides exclusive licence to the client for the use of such documents by the client in all matters directly relating to the project, with no limitation on the number of times that the client may reproduce any report. The client's contribution will be acknowledged in any future use of the work by YA.

5.10. OASIS

- 5.10.1. An OASIS online record will be initiated (<http://ads.ahds.ac.uk/project/oasis/>). A copy of this document will be included in the report.

5.11. Programme

- 5.11.1. Following approval of the WSI a date for fieldwork will be proposed.

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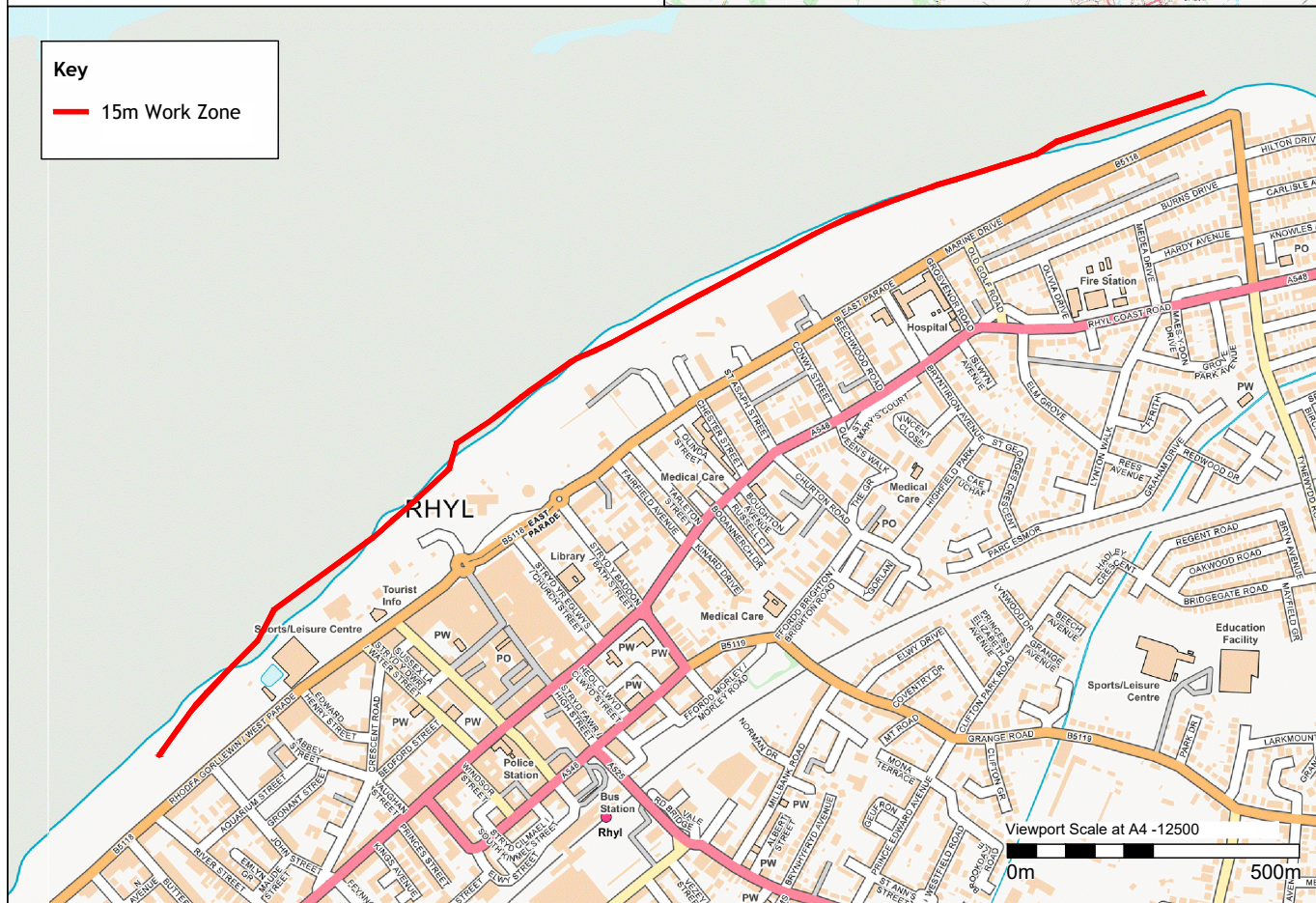
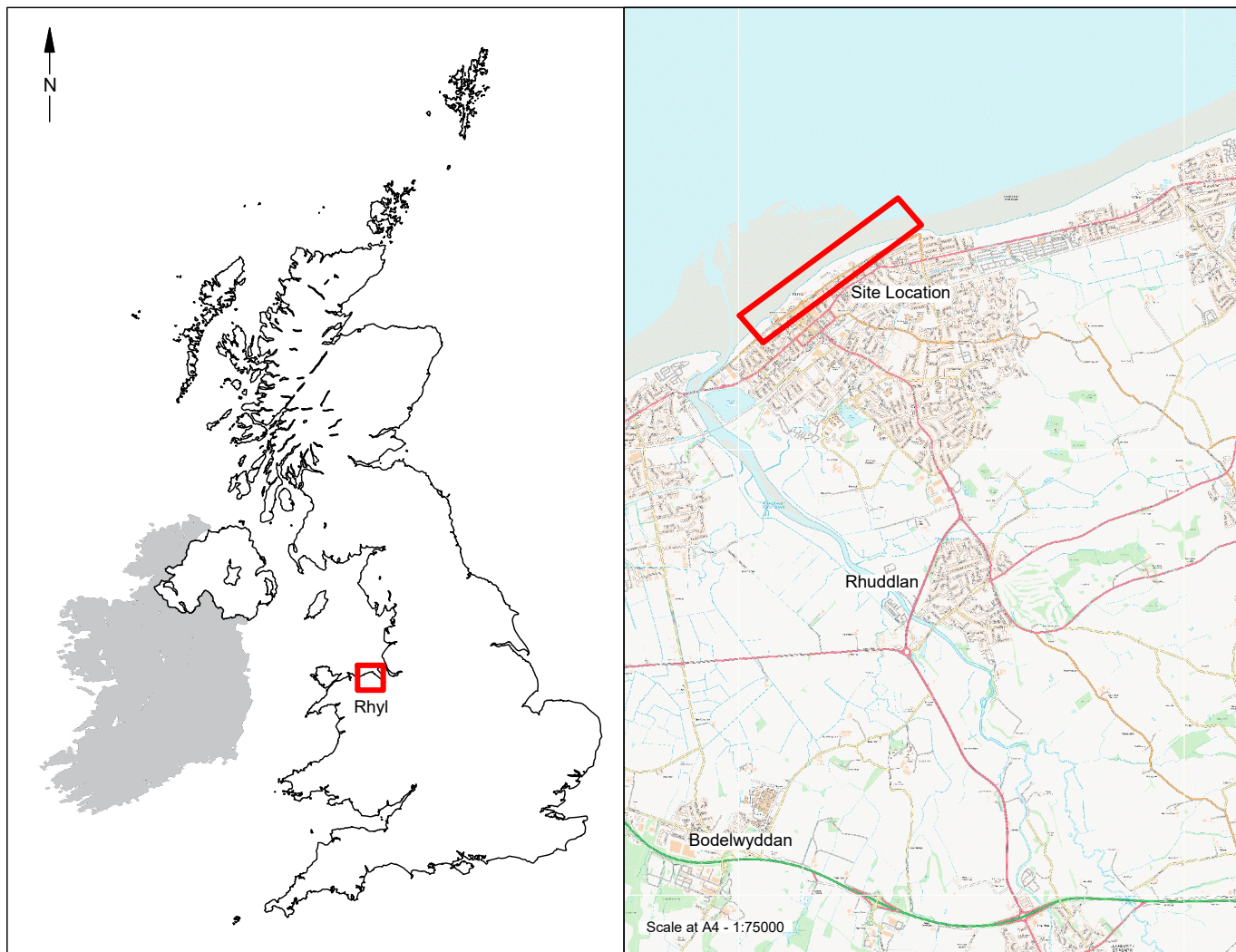


Figure 01 - Location Map
Rhyl Coastal Defence

Scale at A4 - varies
Drawn by MI

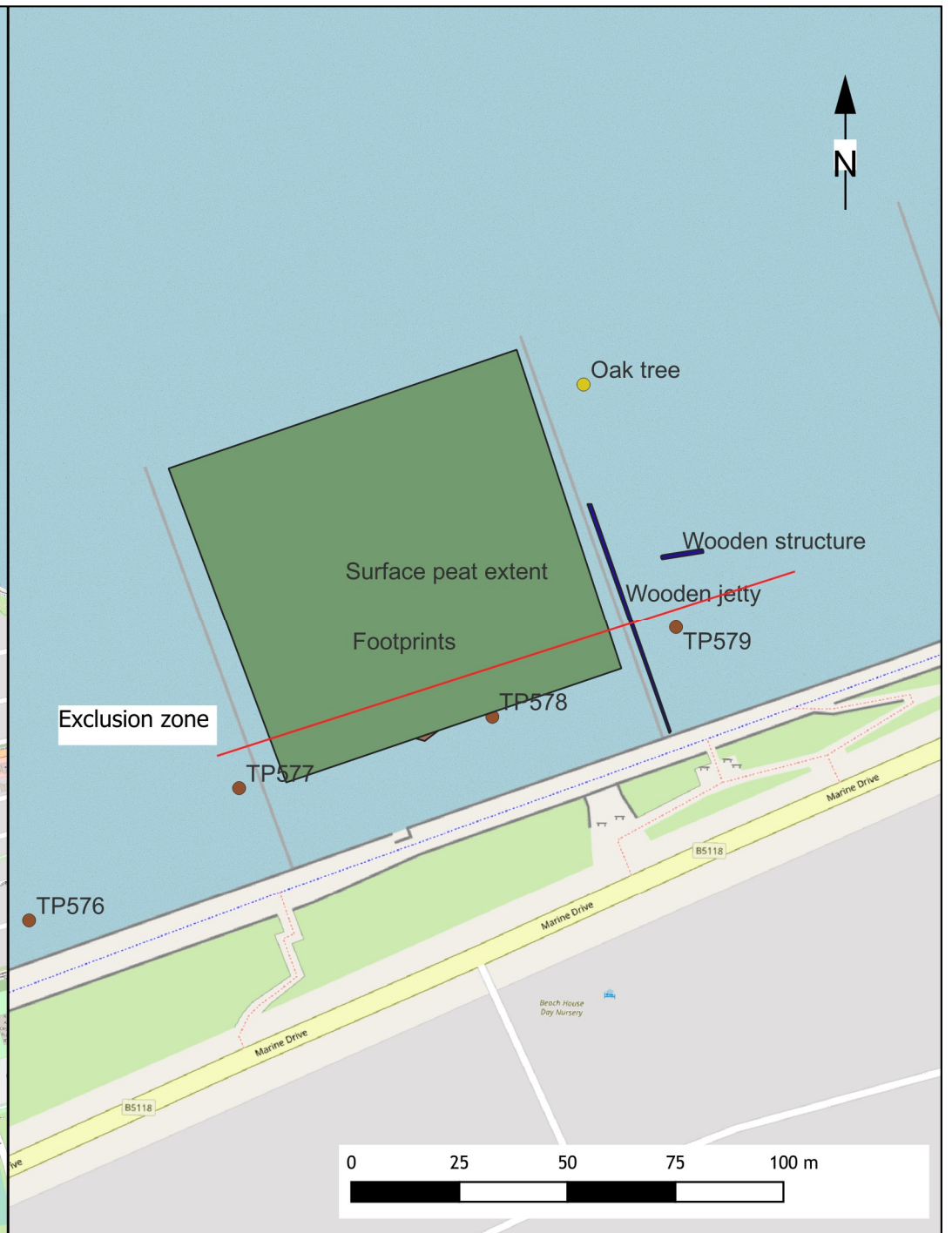


Figure 02 – Peat extent at surface and location of notable features
Rhyl beach

Scale at A4 – Varies

Drawn by: LP

Appendix 1

Darkness	Degree of Stratification	Degree of Elasticity	Degree of Dryness
nig.4 black	strf.4 well stratified	elas.4 very elastic	sicc.4 very dry
nig.3	strf.3	elas.3	sicc.3
nig.2	strf.2	elas.2	sicc.2
nig.1	strf.1	elas.1	sicc.1
nig.0 white	strf.0 no stratification	elas.0 no elasticity	sicc.0 water

	Sharpness of Upper Boundary
lim.4	< 0.5mm
lim.3	< 1.0 &>
lim.2	0.5mm
lim.1	< 2.0 &>
lim.0	1.0mm
	< 10.0 &> 2.0mm
	> 10.0mm

	<i>Sh</i>	<i>Substantia humosa</i>	Humous substance, homogeneous microscopic structure
<i>I Turfa</i>	<i>Tb</i>	<i>T. bryophytica</i>	Mosses +/- humous substance
	<i>Tl</i>	<i>T. lignosa</i>	Stumps, roots, intertwined rootlets, of ligneous plants
	<i>Th</i>	<i>T. herbacea</i>	Roots, intertwined rootlets, rhizomes of herbaceous plants
<i>II Detritus</i>	<i>DI</i>	<i>D. lignosus</i>	Fragments of ligneous plants >2mm
	<i>Dh</i>	<i>D. herbosus</i>	Fragments of herbaceous plants >2mm
	<i>Dg</i>	<i>D. granosus</i>	Fragments of ligneous and herbaceous plants <2mm >0.1mm
<i>III Limus</i>	<i>Lf</i>	<i>L. ferrugineus</i>	Rust, non-hardened. Particles <0.1mm
<i>IV Argilla</i>	<i>As</i>	<i>A. steatodes</i>	Particles of clay
	<i>Ag</i>	<i>A. granosa</i>	Particles of silt
<i>V Grana</i>	<i>Ga</i>	<i>G. arenosa</i>	Mineral particles 0.6 to 0.2mm
	<i>Gs</i>	<i>G. saburralia</i>	Mineral particles 2.0 to 0.6mm
	<i>Gg(min)</i>	<i>G. glareosa minora</i>	Mineral particles 6.0 to 2.0mm
	<i>Gg(maj)</i>	<i>G. glareosa majora</i>	Mineral particles 20.0 to 6.0mm
	<i>Ptm</i>	<i>Particulaetestaemollosorum</i>	Fragments of calcareous shells

Physical and sedimentary properties of deposits according to Troels-Smith (1955)

Feature type	Sediment conditions	Overall scope of sampling	MM	Charred material	C14	OSL	Pollen/Diatom	Ch	BP/BS	Bo	Wood
Sampling method:			Undisturbed block sample small kubiena tin	Loose bulk sample, representative of particle size, and quantity for desired methods	A4x1 cm (sea l)	Light-tight canister, moisture/sediment sample; where available, gamma spec background radiation measurement.	column in gutter + Clingfilm	Min.40L for dry deposits or 20L from waterlogged deposits (specialists to advise as to appropriate level of sub sampling of deposit)			In bags with water
Archaeological Feature/ buried soil	Waterlogged organic (looks 'peaty')	Each occurrence series of samples if thick (>150mm)		x			x	x	x	x	X
	Dry visible charred material	Each occurrence (C14 selected: best is twigs then layer)	x	x	x			x		x	
	Waterlogged organic	Each occurrence, at thickest point or every 10cm	x		x		x	x	x	x	X
	Dry visible charred material	Each occurrence, at thickest point, series of samples if thick (>150mm)	x		x		x	x		x	
	Buried soil horizon	Across soil profile	x			x	x	x			
Sediment change, reaction to environmental change	Laminated or changes in sediment in profile	Sample of each sedimentation type, in middle of sediment unit, or over equal interval		x	x	x	x				
Any	Wood structure	Retain all, keep damp, bag each timber separately			x						x
Industrial residues / debris etc.		All process stages to be represented							x		
Abbreviations MM Micromorphology C14 Radiocarbon BP Waterlogged Beetles/Plant remains Bo small bone. BS –Bulk Sample (industrial waste/residues/processing debris) CS Sediment sample											

Table 1 Preliminary Site Sampling Strategy

*Adjustments to be made following specialist advice and liaison with development control archaeologist where appropriate