Environmental Reconstruction At Island House
Summary Of Work And Findings December 2021

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This report summarises work completed to date on the environmental reconstruction at Island House. Some preliminary interpretations are outlined, these will be refined once the remaining GPR, coring and dating work is concluded in early 2022.

1. Sediment logging

Four exposed sediment sections were logged in August 2021 and November 2021 (Figure 1). Log 1 comprised a sediment section exposed by Dyfed Archaeological Trust's excavation work; it was initially described in their 2020 report (DAT, 2020). Log 2 was located on the western margin of a small watercourse that formerly ran beneath Island House. Logs 3 and 4 were taken from excavated pits. At each log site, distinct sediment units were identified and their characteristics described in terms of grain size, colour, sediment sorting, the nature of matrix/grain contacts, and the presence of macrofossils / organic material (Figure 2). This systematic logging process enables direct comparison of sediment sequences at different localities and will facilitate interpretation of the sediment accumulation story at the site (from natural fluvial/marine processes and/or human activity).

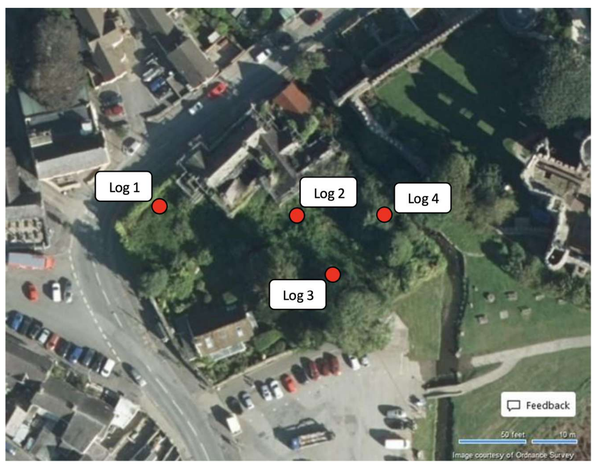


Figure 1: Location of sediment logs within the Island House boundary (Image from Bing Maps)

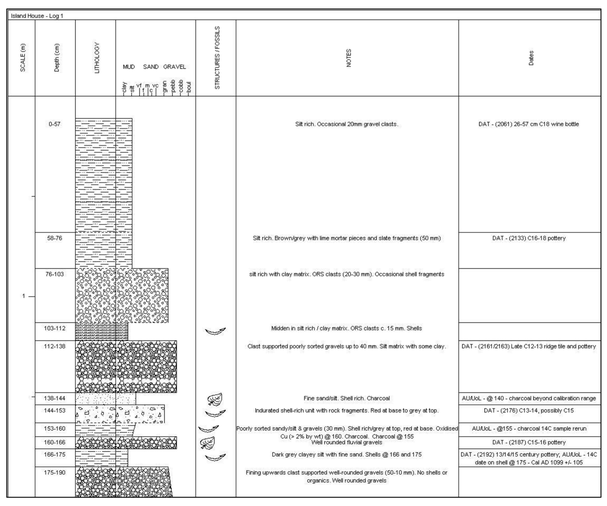


Figure 2 – Log 1 sediment stratigraphy and dates. In the final 'Dates' column, DAT indicates dating information from Dyfed Archaeological Trust (2020), and AU/UoL refers to 14C dates secured through this study.

2. Radiocarbon dating

Following sediment logging within the footprint of Island House in August 2021, 5 organic material samples were submitted to the Radiocarbon Dating Facility, Queens University, Belfast for 14C dating. Table 1 summarises the calibrated dates and stratigraphic context for each sample.

Two of the samples were taken from oak beams which had already been independently dated using dendrochronology (Stephen Kirkwood, pers comm). Interestingly, the 14C and dendro dates for oak beam 2 are indistinguishable (mid 15th century), and the dendro date for beam 1 lies within the error margin of the 14C date (mid 16th – mid 17th century). These dates suggest that the beams were either recovered from parts of the building constructed at different times, or that there had been some mid 16th/17th repair work (beam 1) to an older (mid 15th century?) part of the building (beam 2).

Table 1: Summary of 14C dates

Sample (code)	Log number	Depth (cm)	Calibrated age	Notes
Oak beam 1 (UBA-45962)	n/a	n/a	cal AD 1509-1793 with a median probability of cal AD 1568	Dendrochronology date: AD 1657
Oak beam 2 (UBA-45963)	n/a	n/a	cal AD 1434-1475 with a median probability of cal AD 1444	Dendrochronology date: AD 1437
Charcoal (UBA-45965)	1	140	Invalid age	53991 +/- 5436 years outside the acceptable range for ^{14}C. Likely contamination with 'old' carbon.
Charcoal (UBA-45966)	1	155	Sample rerun	Laboratory is rerunning the sample due to an error flag on the original analysis
Shell (UBA-45964)	1	175	AD 1099 +/-105	50% marine reservoir effect correction applied to original radiocarbon age: 1150 +/- 19 [Delta R = -141.0 +/- 54.0]

Collating evidence from sediment logging, archaeological investigations and 14C dating indicates evidence of human activity throughout most of the 190 cm sediment sequence (Fig 1). The dated shell at 175 cm (AD 1099 +/- 105) was recovered from just above well-rounded fluvial gravels and could indicate earliest evidence of human activity at the site (i.e. soon after the Norman conquest); 13th/14th/15th century pottery between 166 and 175 cm confirms ongoing human occupation throughout the Norman and Medieval periods. A small sample of oxidised copper at 160 cm was recovered close to fragments of charcoal at 155 cm. The charcoal was submitted for dating but is being rerun due to an analytical error. It is likely that this sample, and the charcoal sample at 140 cm, are both contaminated with 'old' carbon, possibly suggesting burning of a fossil fuel (i.e. coal) at the site. The presence of enriched (>2%, and up to 20%) oxidised Cu at 155 cm could indicate early metallurgical activity (e.g. bronze manufacture).

3. GPR surveys

In October 2021 six GPR profiles were surveyed across the saltmarsh (Lines 1 and 2), within the footprint of Island House (lines 3 and 4) and at the ORS Field Play Area and Park (Lines 5 and 6) (Figure 3). Each GPR line was surveyed twice using 50 MHz and 100 MHz frequencies; high frequencies provide higher resolution imagery but lower penetration depth. In addition, a 100 MHz velocity survey was conducted at each of the three locations to enable more accurate calibration of survey depths (See Appendix 1 & 2 for example radargrams with provisional sub- surface reflector mapping).

Two additional GPR surveys will be conducted once a new fibre optic cable has been supplied by the equipment manufacturer. First, a higher frequency survey (250/500 MHz) will be conducted at the 3 sites already surveyed. Second, two further GPR lines (at all 3 frequencies) will be surveyed at the Clifton Street site (opposite St Martin's Church).

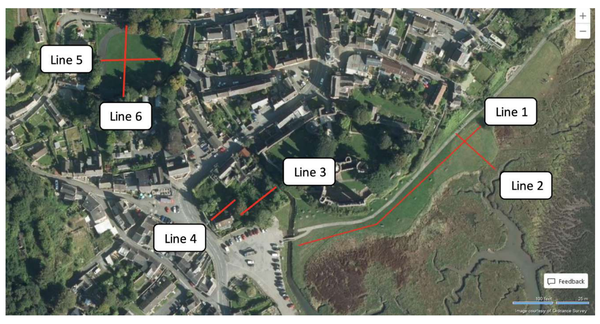


Figure 3: Location of GPR survey lines

Initial analysis of the radargrams (see Appendix 1) indicates a steeply shelving (15-20%) bedrock reflector dipping to the southeast (Line 2) which is covered by sub-horizontal or dipping estuarine sediments. GPR line 1 indicates the presence of possible buried channel channels, these will be confirmed once the higher resolution survey is conducted.

4. Coring

In November 2021 a 2-day coring programme was undertaken at 4 locations (Figure 4). The purpose of this programme was to recover sediment for logging and the recovery of material for 14C dating (see section 1). Core 1, on the saltmarsh, was located with the intention of just recovering an estuarine record of sedimentation, whereas core 2 is anticipated to contain a combination of fluvial (R. Coran) and estuarine activity. Cores 3 and 4 at the Clifton Street site are sufficiently upstream to just contain a record of fluvial activity.

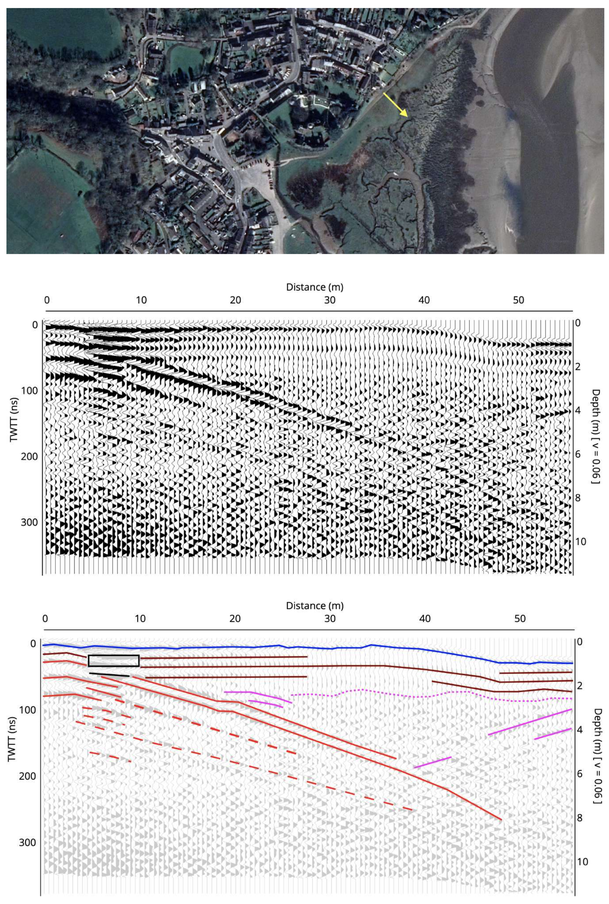
At 3 sites (cores 2, 3 and 4) drilling reached a depth of 4m, but sediment recovery rates, especially at sites 3 and 4, steadily decreased with depth (from c. 90% between 0-1 m to as low as 25% between 3 and 4 m. At site 1 drilling reached 4.7 m and sediment recovery rates were higher. The increasingly low sediment recovery rate as depth increased appeared to be related to air , compressed within the core gouges, not escaping during the drilling operation. Samson Drilling indicated that this 'piston effect' could be overcome by using an alternative drilling technique in the New Year.

At the Clifton Road site, a rich wood layer was intersected between 3-4 m (precise depth indeterminate due to the piston effect noted above). This organic matter, or equivalent material collected from a follow-up coring survey, will be sent for 14C dating in the New Year. It will form a key component in understanding the fluvial sedimentation history of the Coran upstream of Island House.

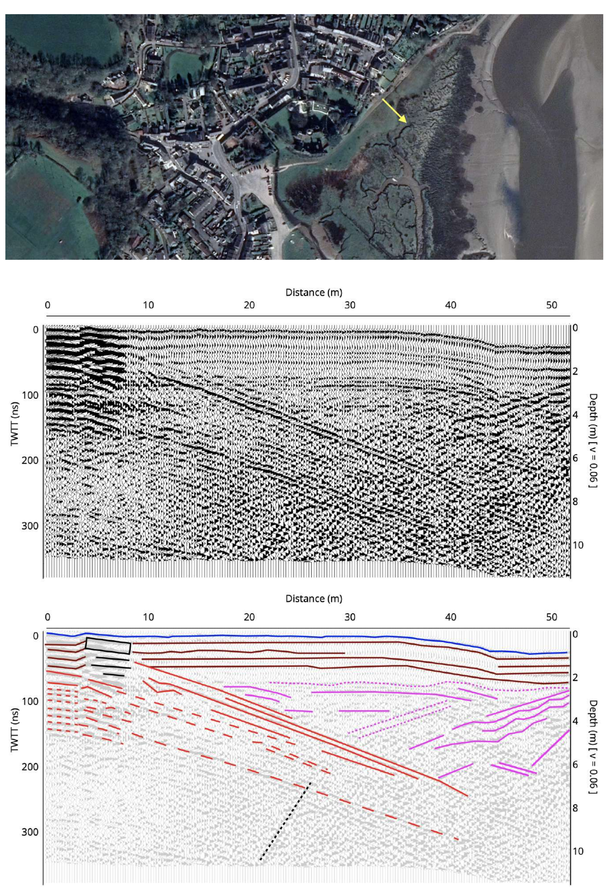
Figure 4: Location of November 2021 coring sites: A) salt flats, and B) Clifton Street.

Appendix 1

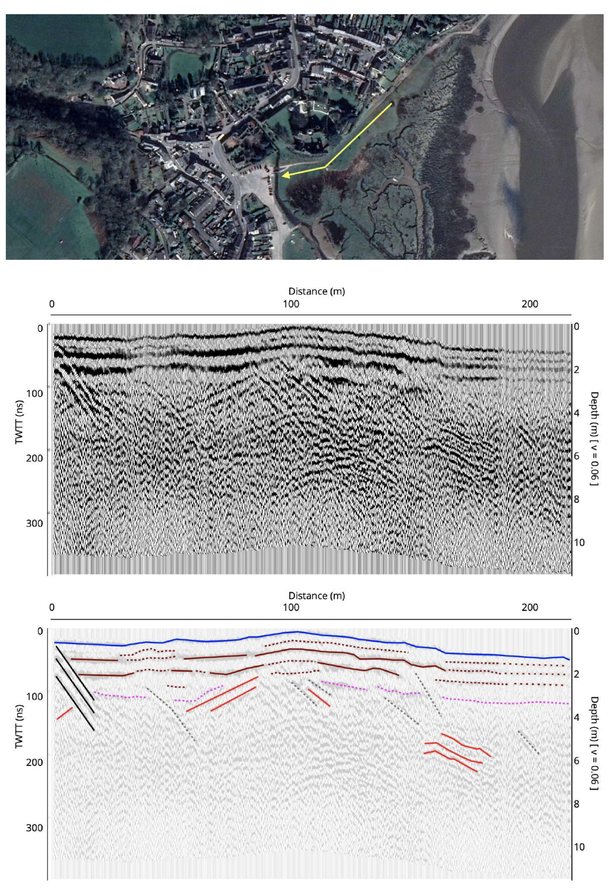
River Island House Project 2021 :
GPR - 50 MHz profile : Castle wall to salt marsh



River Island House Project 2021 :
GPR - 100 MHz profile : Castle wall to salt marsh



River Island House Project 2021 :
GPR - 50 MHz profile : Below castle to river



River Island House Project 2021 :
GPR - 100 MHz profile : Below castle to river