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Published in:
Antiquity

DOI:
[10.15184/aqy.2022.132](https://doi.org/10.15184/aqy.2022.132)

Publication date:
2022

Citation for published version (APA):

Parker Pearson, M., Pollard, J., Richards, C., Welham, K., Kinnaird, T., Srivastava, A., Casswell, C., Shaw, D., Simmons, E., Stanford, A., Bevins, R., Ixer, R., Ruggles, C., Rylatt, J., & Edinborough, K. (2022). How Waun Mawn stone circle was designed and built, and when the Bluestones arrived at Stonehenge: A response to Darvill. *Antiquity*, 96(390), 1530-1537. <https://doi.org/10.15184/aqy.2022.132>

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How Waun Mawn stone circle was designed and built, and when the Bluestones arrived at Stonehenge

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Introduction

Darvill's argument that the plan of the known features at Waun Mawn can be reworked into a series of linear monuments suffers from a major error. He has based his argument on a partial plan, published in 2021 but subsequently superseded by a much more detailed plan published after the 2021 excavations (Parker Pearson *et al.* 2021a; Parker Pearson 2022; see our Figure 1). His specious argument therefore simply omits many of the excavated features that make up this stone circle. The reader should ignore Darvill's Figure 1 and refer only to our plan to understand the site.¹⁴

How do we know that Waun Mawn is a circle? Because it has a centre. Amongst other features discovered in summer 2021, we discovered a hearth at the exact centre of the 110m-diameter Waun Mawn circle, partly covered by deposits from the base of a large, fallen tree.

Building the unfinished stone circle of Waun Mawn

While we await radiocarbon dates from the wood charcoal of the bowl-shaped hearth at the centre and from the layers above it, it is worth commenting on the context of both hearth and tree. These were uncovered within a 5m x 5m trench in the centre of the circle (Figure 1). Not only is the hearth at the exact centre of the circle but it is the only hearth detected within over 1,200sq m of trenches excavated at Waun Mawn. The hearth is highly likely to have been in use when the stone circle was constructed or standing since its positioning at the circle's centre could only have been made when the circle was being laid out, or at least extant.

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¹⁴ Fills of stoneholes were clearly distinguishable and carefully recorded by a very experienced team, and Darvill's comment that he personally thinks that the photograph of one stone socket looks like a field clearance scar is wide of the mark.

This hearth was set at the foot of a large tree, prior to the tree's fall since its upcast covered the hearth. Tree roots and tree holes have been found at various locations within the 1,200sq m area excavated at Waun Mawn, likely to date to anywhere between the Early Mesolithic and the Roman period on the basis of radiocarbon dates on wood charcoal (Parker Pearson *et al.* 2021b). Yet none of these other tree features are as large as the remains of the 3m-diameter base of this tree at the centre of Waun Mawn. It seems possible that an unusually large and ancient tree was chosen as the centre from which to lay out the stone circle. We cannot say what species this tree was but oak is a reasonable guess given its size and the ubiquity of *Quercus* charcoal at its location and around Waun Mawn more widely.

Excavations in 2021 also uncovered a further three stoneholes and five pits around the circle's circumference (Figure 1). These five pits (and another excavated in 2018) all lie along the southern arc of the stone circle's circumference but never held standing stones. Continuing a line southwestwards from the last stonehole in the east (stonehole 105 in Trench 12), they provide evidence that this unfinished circle was abandoned in mid-construction. One of the pits (pit 120) lies at the end of an arc of stoneholes with which it shares similar spacing, suggesting that this hole was dug to receive a stone that was never erected. The other pits in this southeastern arc are similar, likely also to be preparation pits that never held a stone.

Although at least 140m of the circle's 345m circumference remains unexcavated (parts of it are protected as a Scheduled Ancient Monument and it lies within a SSSI, limiting the scale and extent of excavations), it is evident that there are significant gaps along the western and southern arcs, revealing that probably no more than 30% of the circle was ever completed.

Re-investigation in 2021 of the solstice-oriented entrance of the circle revealed that what had been thought in 2018 to be the stonehole for the lefthand stone (now recumbent) was in fact a robbing hole. Dates around and after 2000 BP for charcoal from this hole and the low mound accumulated around it provide a likely date for the stone's toppling. More interestingly, the actual stonehole (128) was positioned within 0.10m of a large stakehole. Both features are on an alignment from the central tree towards midwinter solstice sunrise. The stonehole forming the righthand side of the entrance (21), 15m to the east, also had a stakehole in the bottom of its fill. These are the only two stoneholes out of the 10 excavated that have associated stakeholes.

As an incomplete stone circle, Waun Mawn offers an unparalleled insight into the likely sequence of construction of such a circle:

1. Light a fire in a bowl-shaped hearth at the foot of an ancient tree chosen as the centre of the circle;
2. Erect a post on the circumference towards midsummer solstice sunrise from the tree;
3. Erect a second post 15m from the first to mark the other side of an entrance to the circle;
4. Erect standing stones (in stoneholes 128 and 21) beside each post to form this northeast-facing entrance;
5. Erect two standing stones (stoneholes 91 and 118) at the opposite (southwest) side of the circle to the entrance;
6. Erect standing stones in two arcs, one 30m long in the east and one 60m long in the north;
7. Dig preparation pits (45, 47, 49, 120, 123, 132) to hold standing stones in an arc 70m long in the south and southeast.

At this point the circle was abandoned, leaving two long arcs incomplete – one on the southeast–south side and the other on the west–northwest. These could effectively be

considered the ‘sides’ since the frontal façade and entrance were already erected as were the two stones marking the rear (southwest side).

Dismantling the stone circle of Waun Mawn

Whilst four stones remain at Waun Mawn, eight empty stoneholes reveal that their standing stones were taken away, and our hypothesis is that the stones were removed when this incomplete stone circle was dismantled. We await further radiocarbon dates on wood charcoal from fills of the holes left by removal of these eight stones. However, another set of OSL determinations have allowed refinement of the likely date before which the stones were removed. Drawing on results from samples taken in both the 2018 and 2021 field seasons, it is likely that the monoliths were removed before or during 3490–2870 BC (3180 ± 310 BC).

OSL dating of the packing fills of the stoneholes excavated in 2021 has also refined the likely date of the circle’s construction. The monoliths were erected in the mid to late fourth millennium BC, potentially as late as 3520–2940 BC (3230 ± 290 BC). The depositional age for the packing fill of one stone socket (118), the best reset of the investigated features, has returned a combined age of 3710–3350 BC. This confirms our initial estimate that the circle was constructed *c.* 3400 BC (Parker Pearson *et al.* 2021b).¹⁵

The OSL date of 3490–2870 BC for the stones’ removal is consistent with the dates of construction for Stonehenge Stage 1, both for the enclosing ditch (2995–2900 *cal BC*) and for Aubrey Hole 32 (3080–2890 *cal BC*; Parker Pearson *et al.* 2020: 166–8). This raises the possibility that Waun Mawn’s dismantled stones were among the Bluestones taken to Stonehenge. Yet geological analysis of the remaining stones at Waun Mawn and of chippings from an empty stonehole (91) reveals that they probably derive from unspotted dolerite outcrops at Cerrig Lladron, west of the two locations identified as sources of Stonehenge’s unspotted dolerites (Bevins *et al.* 2022). On the balance of probability, it is likely that few if any of the stones taken from Waun Mawn ever ended up at Stonehenge.

Even if Waun Mawn was not the source of any of Stonehenge’s Bluestones, it must be considered as a place of significance in the Stonehenge story. The abandonment of the Waun Mawn circle suggests either some form of breakdown in community and/or cooperation, or external disruption of what was intended as a major monument. The stones of the Preseli hills are integral to the Wiltshire monument, and understanding the use of Bluestones locally to their quarries before their use at Stonehenge widens our knowledge of the Neolithic of Southern Britain, and what was going on in Wales and Wessex.

So when did the Bluestones arrive at Stonehenge?

Stonehenge’s ring of Aubrey Holes belongs to Stage 1 of its construction (starting 3080–2950 *cal BC* and ending 2865–2755 *cal BC* at 95% probability; Marshall in Parker Pearson *et al.* 2020: table 11.7 [the date ranges used by Darvill have since been revised]). Various arguments have been rehearsed over the last 100 years about whether or not the Aubrey Holes contained Bluestones (Parker Pearson *et al.* 2020: 164–9). Our *Stonehenge Riverside Project* team have been fortunate to not only re-excavate an Aubrey Hole but also to excavate numerous other Neolithic stoneholes and postholes in the surrounding chalkland landscape (e.g. *ibid.*: 215–300). Telling the difference between the two types of cut features is now relatively easy. Of course, the standards of early twentieth-century excavations make this task

¹⁵ The OSL technical report will be published alongside the monograph describing the full excavation in due course. The OSL dataset is comprised of 302 field measurements, of which 239 were progressed to laboratory characterization, fully contextualizing the 31 discrete dating samples.

more difficult for the Aubrey Holes but there is a statistical means of discrimination between postholes and Bluestone holes.

Postholes are deeper than stoneholes. At Stonehenge and Durrington Walls, postholes tend to have a width:depth ratio of $\geq 1:1.10$ whereas Bluestone holes have a ratio of $\leq 1:1.10$ (Parker Pearson *et al.* 2009: fig. 8; 2020: fig. 4.5). The Aubrey Holes are clearly shallower and have less variation in depth than the Bluestone holes (Figure 2). Even though three Aubrey Holes are greater than 1.5m in diameter, they are all less than 1.3m in depth. The maximum depth range of the Bluestones is just over 1.5m. Thus, as postholes are deeper than stoneholes, it is unlikely that the Aubrey Holes held anything other than stone.

Darvill also argues that the Aubrey Holes held posts rather than stones on the basis of the absence of Bluestone chips in their basal deposits (as opposed to their secondary deposits in which such chips are plentiful). These chips are assumed to result from breakage during a monolith's erection so why are they absent from the bases of the Aubrey Holes? Chalk is a soft rock whereas most of the Bluestones are of hard, igneous rock, so it would always have been unusual for fragments to become detached from a monolith (whether dressed or unworked) while inserting it or removing it from its surrounding chalk. Secondly, most of the Aubrey Hole basal layers are likely to have been packing deposits inserted around a raised monolith and thus unlikely to contain any chippings deriving either from stone-dressing or from damage caused during erection. Our excavation of seven stoneholes at Bluestonehenge failed to find a single chipping (Parker Pearson *et al.* 2020: 215–300).

Working from the other end of the Bluestones' journey at their starting point in Preseli, there is further evidence that they belong with the start of Stonehenge Stage 1. Even if Waun Mawn was not a source of Stonehenge's Bluestones, radiocarbon dates of 3020–2920 cal BC and 3270–2910 cal BC for the end of their quarrying at two Preseli outcrops are unusually close to the start dates for Stonehenge (Parker Pearson *et al.* 2019). In such a scenario, some or even all of the Bluestones could have come direct to Stonehenge from their quarries. The hypothesis that we consider to be most plausible is that the quarried Bluestones were first erected in one or more stone circles that were dismantled and moved from southwest Wales to Stonehenge and Bluestonehenge in the thirtieth century BC.

Conclusion

It may be that none of Waun Mawn's stones ever reached Stonehenge since Bevins *et al.*'s (2022) new analysis reveals that the stones at Waun Mawn have no geological match to Stonehenge. But Waun Mawn was most certainly a stone circle, albeit unfinished and partially dismantled. Intriguingly, its plan is similar to the Bluestones' arrangement in the Q and R Holes of Stonehenge Stage 2, a circle that was also reckoned to be unfinished, similarly abandoned along its west side during construction (Atkinson 1979: 205–6; Cleal *et al.* 1995: 180, fig. 80). We suggest that this similarity of plan is because both circles were built in the same sequence of stages, with the Q and R Hole circle abandoned at a slightly later stage to that of Waun Mawn.

The case for the Bluestones arriving at Stonehenge during Stage 1 is also very strong, based on the dimensions of the Aubrey Holes as consistent with holding Bluestones and not timber posts. The abandonment and later dismantling of Waun Mawn provides insight into the process of stone circle construction as well as raising new intriguing questions about the background to Stonehenge's creation – we now know that monuments were erected close to the stone sources and subsequently dismantled, before the unparalleled moving of around 80

Bluestone monoliths to form two Neolithic stone circles 170 miles away on Salisbury Plain. Hypothesising as to why this happened is beyond the scope of this brief reply.

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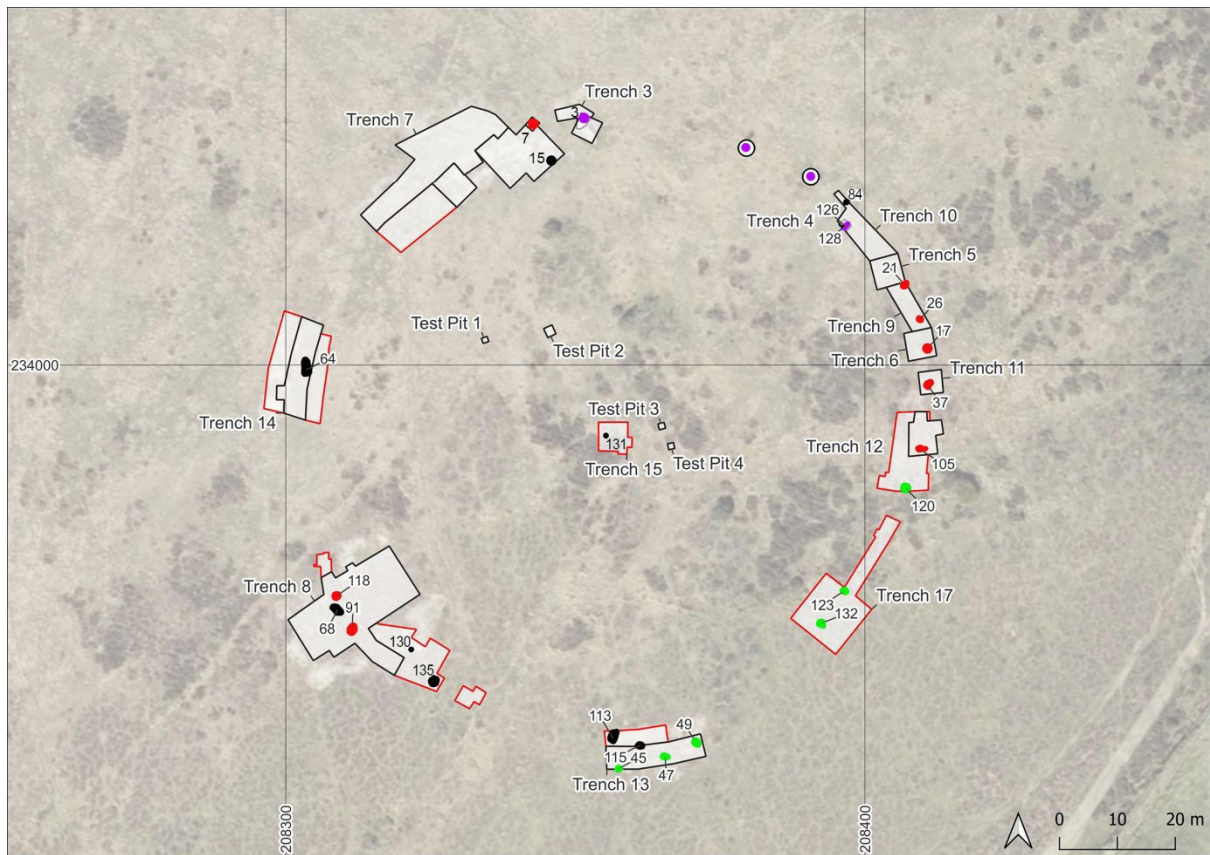


Figure 1. Plan of the unfinished and dismantled stone circle of Waun Mawn, Pembrokeshire. Remaining stones, standing and recumbent (purple) are shown, with stoneholes of dismantled standing stones (red), pits dug for standing stones but never used (green) and other features (black). Viewed from the hearth (131) at the centre of the circle, the midsummer solstice sun rose within the entrance formed by Stoneholes 128 and 21

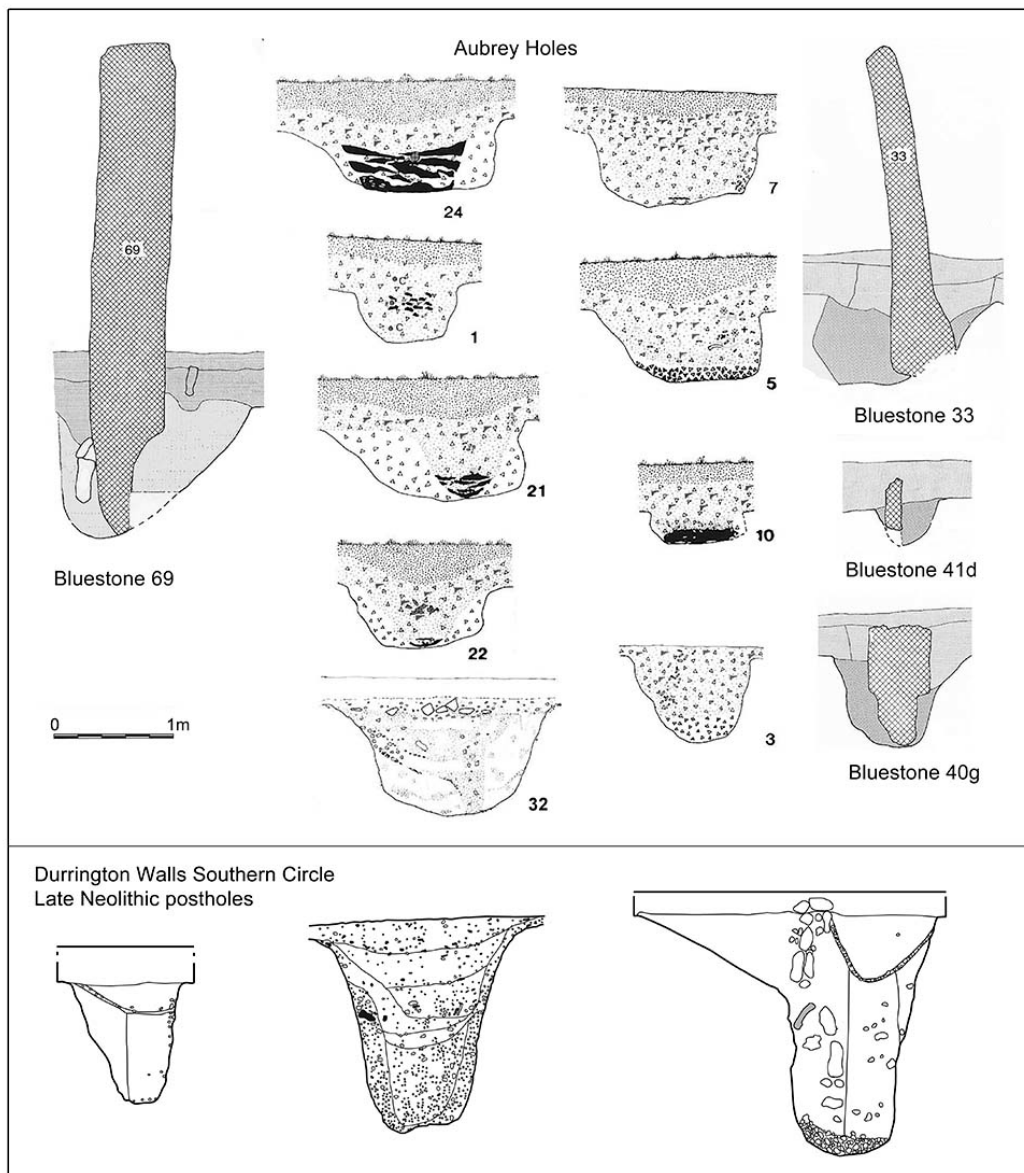


Figure 2. The relative sizes and shapes of a selection of Aubrey Holes (in profile) compared with holes for Bluestones 69, 33, 41d and 40g from Stonehenge and with holes for posts at Durrington Walls (after Cleal *et al.* 1995, Wainwright with Longworth 1971). Bluestone 69's hole has the deepest recorded depth for a Bluestone at Stonehenge, probably because it is the only one set into chalk backfill rather than chalk bedrock.