

Waun Mawn stone circle: the Welsh origins of Stonehenge

Interim report of the 2018 season



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Summary

One of the great mysteries of prehistory is why Stonehenge's 'bluestones' came from over 140 miles away in west Wales. While Stonehenge's sarsen stones are thought to be local to the Avebury area, 20 miles to the north, the smaller bluestones (mostly weighing 1-3 tons) came from the Preseli hills of west Wales. Our aim is to find out why Stonehenge was built of stones from such distant sources.

Over the last seven years, the Stones of Stonehenge project has identified and excavated two of the outcrops from which bluestones were quarried in c.3300-3000 BC, before these megaliths were erected at Stonehenge in its first stage in c.3000-2920 BC. Archaeologists and geologists have hypothesised that Stonehenge's bluestones might have first been erected as a stone circle in west Wales, that was later dismantled and moved to Salisbury Plain, rather than being brought directly from their quarries.

Archaeological excavations at the partial stone circle at Waun Mawn uncovered stone holes of two of its four remaining monoliths and revealed 12 further features extending beyond the ends of the arc of monoliths. Six of these features were holes for standing stones removed in antiquity. Radiocarbon and optically stimulated luminescence (OSL) dates are awaited for samples taken from these features at Waun Mawn.

Together with the four remaining monoliths at Waun Mawn, the six stone sockets excavated in 2018 form part of a former stone circle with a diameter of c.110m. This makes Waun Mawn the third largest stone circle known in Britain.

The empty sockets contained the imprint of the monoliths that had each stood in these holes. They range in size from 0.2m across to 0.6m across and were mostly held in place with packing stones before their removal at some point in antiquity before the growth of peat. The largest of these stones had an unusual pentagonal-shaped base which can be matched with Stone 62 at Stonehenge. A large flake of dolerite that appears to have become detached from the Waun Mawn monolith during its erection or removal, is of the same type of rock as that of Stone 62 at Stonehenge.

Further links with Stonehenge are provided by the discovery that one of the former standing stones on the northeast sector of the circle, singled out by its construction on a mound, is potentially aligned from the circle's centre towards either midsummer solstice sunrise or northern major moonrise. The stone's location is enhanced by its placement on top of a low artificial mound. Secondly, the diameter of Waun Mawn circle is the same as the diameter of Stonehenge's perimeter ditch; no other Neolithic monuments in Britain are known to share this diameter.

Like the other great stone circles of Britain, Waun Mawn is expected to date to the Neolithic around 3000 BC. Together with a Neolithic causewayed enclosure at Banc Du, a Neolithic palisaded enclosure at Dryslwyn, and seven Neolithic tombs, it forms a major ceremonial complex within the Preseli hills and their environs. This provides a new insight into the significance of the source of Stonehenge's bluestones, and raises interesting new questions about the relationship of this complex with that on Salisbury Plain, such as why Stonehenge was built out of one or more second-hand monuments.

Research goals

The project's overall goals are:

1. To investigate the source area of Stonehenge's bluestone monoliths in the Preseli hills, identifying megalith quarries and locating other Neolithic sites and monuments associated with bluestones.
2. To discover whether the bluestones were incorporated initially into one or more Pembrokeshire monuments before being transported to Wiltshire.
3. To explore the quarrying of the bluestones in Preseli and their subsequent use, including their journey to Stonehenge, to clarify the purpose of Stonehenge.

In 2017 our specific goal was:

1. To establish whether an arc of four standing stones (Waun Mawn) forms the remains of a dismantled Neolithic stone circle where bluestones were first erected before being moved to Stonehenge.

Background

Four of Stonehenge's different types of bluestones have been identified to their geological sources in Pembrokeshire, west Wales. Two of these are spotted dolerite and rhyolite, provenanced to outcrops at Carn Goedog and Craig Rhos-y-felin respectively. Remains of megalith-quarrying at these two outcrops have been dated to the period shortly before 3000 BC (Parker Pearson *et al.* 2017; in press).

The bluestones are thought to have been erected at Stonehenge during 3000-2920 BC (Darvill *et al.* 2012). For nearly a century, archaeologists and geologists have wondered whether the bluestones initially formed a stone circle in Pembrokeshire that was subsequently dismantled and moved to Salisbury Plain and re-erected as Stonehenge.

The partial stone circle of Waun Mawn consists today of four monoliths, one of which is a standing stone and the other three are recumbent. They form an arc of monoliths which occupy a saddle on the southeast side of Cnwc yr Hŷ ('the hillock of the deer'), a 339m-high hill on the north side of the Preseli hills, close to the bluestone sources of Carn Goedog, Cerrigmarchogion and Craig Rhos-y-felin. At 311m OD, Waun Mawn has extensive views to the west, the north and the east.

On a clear day, the Wicklow mountains of Ireland are visible to the west and Snowdonia to the north. To the east, the hill of Foel Drygarn is visible together with the outcrops of Carn Meini, Carn Alw, Carn Goedog and Carn Bica along the Preseli ridge. This ridge blocks views to the south where, 3.5km away but hidden below the ridge, a Neolithic causewayed enclosure lies on top of the hill of Banc Du. Though constructed around 3600 BC, this enclosure was re-used around 3000 BC.

The views from the Banc Du enclosure are similarly extensive, across the southern part of west Wales with the Isle of Lundy visible on the horizon. Waun Mawn's stone circle occupies a slight dome on the saddle, with ground gently falling away on all sides except for the northwest. Its perimeter on its east and south sides closely follows the top of the break of slope.

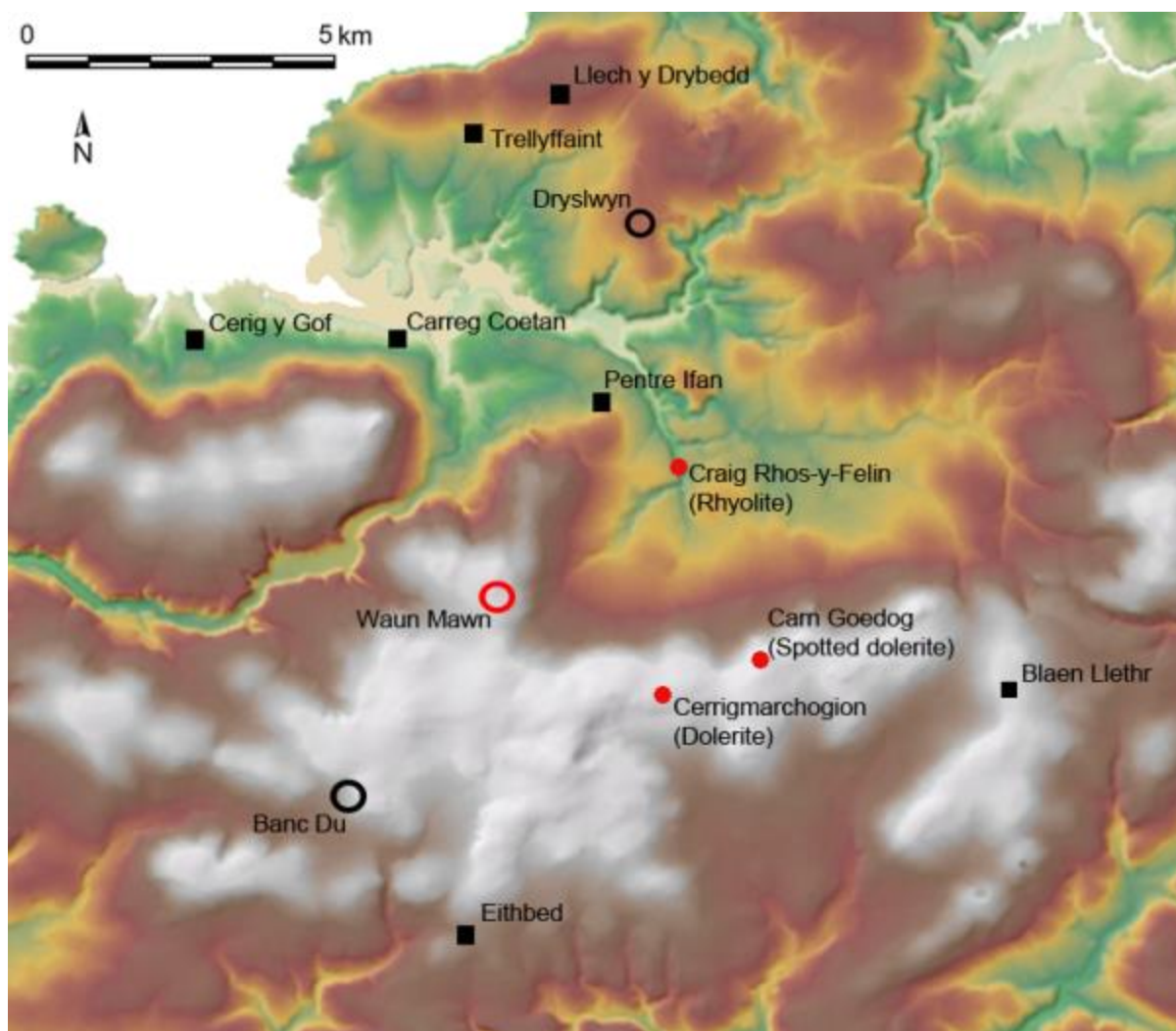


Figure 1. Waun Mawn in relation to identified bluestone sources (red). Black squares are Neolithic tombs and black circles are Neolithic enclosures.

The partial stone circle of Waun Mawn is located at a confluence of rivers. To the southeast lies the source of the western tributary of the River Nevern, while the sources of the River Gwaun and the River Clydach lie downhill to the west.

Waun Mawn, as the name suggests ('peat moorland' or 'peat bog'), is a wet, peaty upland on which blanket bog has created a continuous surface layer of peat over severely gleyed podzol soils in which the old ground surface beneath the peat has become demineralised, leading to migration of iron and other minerals downwards to the top of the subsoil where it forms layers of iron panning. Today, the peat has been largely removed, presumably during peat-cutting in previous centuries; the report of RCAHM's visit in 1914 mentions that 'the surface of the common is much broken up by turf cutting' (1925: 259), indicating that peat deposits survived within the Waun Mawn circle well into the 20th century.

The underlying geology of Waun Mawn is mudstone of the Aber Mawr Formation, covered by thin deposits of glacial drift. Similar mudstones underlie the Neolithic causewayed

enclosure at Banc Du, 4km southwest of Waun Mawn (Darvill *et al.* 2005: 22–3; 2007; Darvill & Wainwright 2016: 75–6).

Magnetometer and earth resistance surveys at Waun Mawn in 2011 failed to identify any sub-surface features that might be stone sockets extending the length of the arc, and these negative results were put down to the problems created by podzolisation. Further surveys in 2018, employing electro-magnetic induction, ground-penetrating radar and earth resistance, also failed to identify any significant anomalies that could be interpreted as stone holes of a dismantled stone circle.

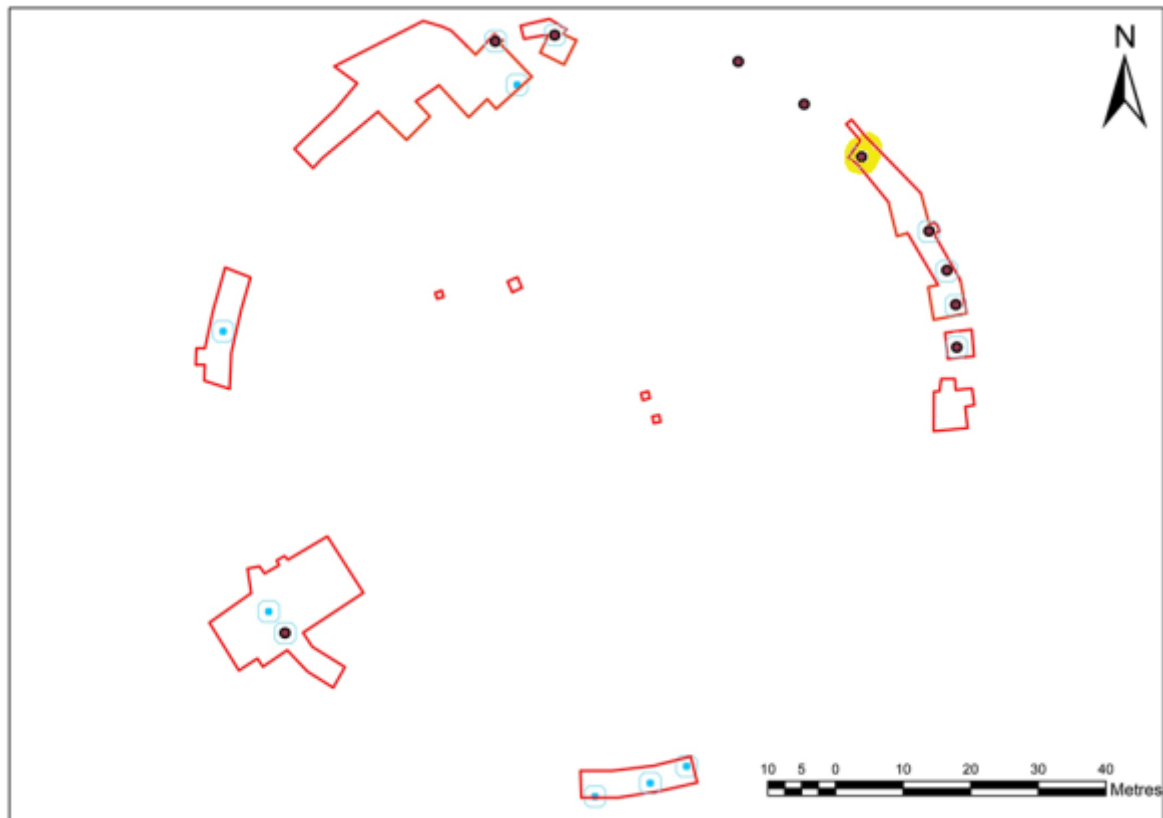


Figure 2. Excavated stones and stone sockets (black circles) and other cut features (blue) at Waun Mawn. The artificial mound on which one stone originally stood is marked in yellow.

Findings

In September 2018, we excavated five main trenches at the partial stone circle at Waun Mawn. These included the stone holes of two of the recumbent monoliths and revealed 12 further features extending beyond the ends of the arc. Six of these features were holes for standing stones removed in antiquity. Together with the four remaining monoliths, they were part of a former stone circle with a diameter of 110m. This makes Waun Mawn the third largest stone circle known in Britain.

The six stoneholes and the four surviving monoliths are described in clockwise sequence, beginning with stonehole 007 in the north-northwest, passing stonehole 037 in the east, and ending with stonehole 091 in the southwest. There was no trace of any archaeological

features within 22m to the southwest of stonehole 007. This suggests either the presence of a very wide entrance to the circle at this point or that the stone circle was never completed.



Figure 3. Locations of excavated features with context numbers at Waun Mawn.

The emptied stone socket 007

In Trench 2, stonehole 007 (0.9m north–south x 0.8m east–west x 0.3m deep) was filled with yellow-brown silt containing two large packing stones. A vertical-sided cut into this layer was filled with grey-brown silty loam, forming the infill of a socket left by the removal of a standing stone. This standing stone's base left a sub-rectangular imprint, 0.25m E–W x 0.3m N–S in the subsoil beneath the centre of the pit.

The bulge in layer 008 to the northwest indicates that this stone pillar was removed at an angle of about 45° by pulling it over and levering it out in that direction. There was no evidence for a ramp along which the stone would have been introduced into the pit before layer 040 was packed around the upright stone. However, the stonehole's slightly asymmetrical plan suggests that the standing stone was introduced either from the southeast or from the northwest.



Figure 4. Stone socket 007, from which a standing stone was removed in antiquity. The stone's imprint can be seen to the left of the north arrow.

The small socket 015 (close to socket 007)

A small socket (0.6m x 0.5m x 0.17m deep) was detected c.5m southeast of stone socket 007. It lies off the line of the arc of standing stones and stoneholes. Its light brown loam fill contained three small packing stones. Its relationship to the stone circle is unknown.

The large recumbent stone next to stonehole 007

A large recumbent stone (excavated in 2017) is the most westerly of the four monoliths that remain of the Waun Mawn stone circle. It is 3.13m long, 1.14m wide and 0.55m thick and lies with its top end to the southeast. It is of dolerite, but is not spotted; its likely source is Cerrigmarchogion (Richard Bevins pers. comm.). Its large and deep socket, at the northwest end of the now-recumbent stone, is lined with many packing stones of dolerite and rhyolite. The stone fell over after the onset of peat growth and thus after the standing stones in stoneholes 007, 015, 021, 030, 017, 037 and 091 had been removed.

Standing stone (unexcavated)

The only monolith still standing at Waun Mawn stands 1.61m high, 0.91m wide and 0.52m thick. Its total length is unknown though the buried portion of this stone is likely to be no more than 0.5m, giving it a likely length of around 2m. From surface inspection, this stone appears to be of unspotted dolerite.

Large recumbent stone (unexcavated)

About 11m to the east of the standing stone lies a large recumbent stone, 3.26m long, 1.62m wide and 0.68m thick. This stone appears also to be of unspotted dolerite. A c.1m-

wide depression in the ground, immediately southwest of the stone could be the pit in which it originally stood.

The small recumbent stone (013) in the northeast

The smaller recumbent stone, excavated in 2017 and again in 2018, is on the east end of the arc and is 1.2m long, 0.9m wide and 0.25m thick. It is of dolerite with white spots, giving it a speckled appearance. It has been matched with a source at Mynydd-bach, a small outcrop east of Cerrigmarchogion and southwest of Carn Goedog, some 3.5km southeast of Waun Mawn (Richard Bevins pers. comm.).

This stone's socket (009) is relatively small (0.60m SE–NW x 0.40m SW–NE x 0.15m deep) with two small packing stones of dolerite and rhyolite in its light brown loam fill.

Unusually, this stonehole was oriented northeast–southwest so that the stone stood end-on to the centre of the circle rather than broadside-on as is more prevalent. This gunsight-like positioning may have marked the direction of either midsummer solstice sunrise or northern major moonrise but this is yet to be confirmed. Its likely significance as an astronomical marker is enhanced by its position on top of a small artificial mound, around 6m in diameter and 0.5m high. The mound consists of four artificial layers but there is no indication of where these fills derived from since there was no surrounding ditch.

The south side of the mound is encroached upon by a sunken trackway running northeast out of the stone circle and curving away to the north. To the south, the trackway runs through the centre of the stone circle to the southwest, again curving slightly westwards as it exits the circle's interior, some 110m south of the mound. At these two points of the circle's perimeter the hollow way is broadly aligned on the midsummer sunrise–midwinter solstice axis; whether this is coincidental is difficult to say since the trackway may have formed much later than the date of construction of the mound and stone circle.

The emptied stone socket 021

The next feature clockwise from stonehole 009 and its mound is stonehole 021. This lies 15m southeast of stonehole 009 (and recumbent stone 013), indicating a substantial gap between these two former standing stones.

Stonehole 021 (0.1m northeast–southwest x 0.65m northwest–southeast x 0.25m deep) contained a sub-rectangular impression (0.2m x 0.2m) in its centre, which could have been left by the base of a removed standing stone. Alternatively this imprint was just part of the irregular underside of a larger stone pillar, with dimensions of c.0.45m SW–NE x 0.2m SE–NW. The fill of this socket produced a single small packing stone. The shallow northeast end of the stonehole formed a ramp by which the stone was introduced into and removed from the pit.

The emptied stone socket 030

Stonehole 030 (0.8m SW–NE x 0.65m SE–NW x 0.28m deep) lay 5.5m southeast of stonehole 021. It was an irregular oval pit, near-vertical at its southwest end and rising as a gradual ramp to its northeast end. Its primary fill of dark brown silt and mudstone fragments contained two large, angular blocks of rhyolite positioned either side (northwest and southeast) of a rectangular void. These two blocks were found to conjoin, indicating

that they had originally formed a single rhyolite block. Between the blocks was an imprint left by a square-sectioned pillar, 0.28m x 0.28m. This void was filled with dark brown silt and mudstone fragments.

It was clear that a standing stone had been inserted from the northeast and then pulled over and withdrawn from the same direction.



Figure 5. Stone socket (030) from which a standing stone was removed in antiquity. The two large packing stones lie either side of the void left by removal of the rectangular standing stone.

The emptied stone socket 017

The emptied stone socket 017 (1m diameter and 0.35m–0.55m deep) has steep sides and an uneven base. Two large packing stones lay at a shallow angle against the south side of the pit.

The emptied stone socket 037

The stonehole 037 was a relatively shallow, oval feature (1.45m northeast–southwest x 0.75m northwest–southeast x 0.2m deep). It was filled with yellow-brown loam and then by soft, grey-brown silty loam within its centre. This later layer is interpreted as the filling of a void left by removal of a standing stone. The imprint of the standing stone was a sub-square depression of 0.25m x 0.25m.

Stonehole 091 on the southwest side of the stone circle

Stonehole 091 (1.7m north–south x 1.2m east–west x 0.3m deep) was large enough to be visible as a slight circular hollow on the ground surface prior to excavation. On excavation, it

was found to be teardrop-shaped in plan with a long, shallow ramp on the south side widening as it leads to a circular pit. In its initial form, it was 1.33m north–south x 0.82m east–west, later enlarged when the standing stone was removed.

The primary fill of mottled orange and yellow-brown silt surrounds a central area in which the imprint of a standing stone has survived. This is a pentagonal impression with each of its five sides between 0.38m–0.47m long, giving the standing stone a diameter of over 0.6m.

Two narrow slots just beyond the northeast side of the pentagonal impression, one east–west and the other north–south, could be voids left by packing stones removed when the stone was dismantled. However, a more satisfying possibility is that these are marks left by wooden levers inserted against the base of the stone to help topple it southwards.

The standing stone was removed along a ramp to the south, the same direction from which it was erected. Its extraction hole was then filled with a sequence of secondary fills containing over 40 struck dolerite flakes. One of these was a large stone flake (22.9cm x 8.4cm) aligned longitudinally along the eastern side of the extraction ramp. With its weathered cortex on its exterior face, it may have been an unintentional removal, detached from the standing stone as it was pulled out of the hole. As with all the other flakes from stonehole 091, it is of unspotted dolerite.

Artefacts found in close proximity (within 2–3m) of stonehole 091 consist of a flint scraper (SF40), a piece of worked flint (SF1) and a trimmed circular mudstone disc (SF3). The mudstone disc is very similar to three such artefacts found in Neolithic levels at Carn Goedog megalith quarry.



Figure 6. 3-D image of Stone socket 091, showing the ramp on its south side (lower centre) along which the standing stone was introduced and removed.

Conclusions

The discovery of five empty stone sockets beyond the west and east ends of the arc of four former standing stones at Waun Mawn, together with another (stonehole 091) on the opposite side of the hypothesised circle, confirms that this monument was constructed to be a large stone circle, as originally hypothesised by the Royal Commission in 1925. With standing stones and emptied stoneholes traced for just over a quarter of the circle's circumference in the north and east sectors (a distance of almost 90m along the circumference), and with stonehole 091 in the southwest sector, it is possible to estimate the circle's planned diameter as c.110m.

This makes Waun Mawn the third largest stone circle in Britain. Although much smaller than the outer ring at Avebury (331m diameter), it is only slightly smaller than the second largest, Stanton Drew in Somerset (113m diameter). It is, however, larger than Long Meg and her Daughters in Cumbria (107m diameter), the Ring of Brodgar in Orkney (103.6m diameter), the north and south circles at Avebury (both 103m diameter), and the Aubrey Hole circle of Stonehenge stage 1 (87m diameter).

The dating of these great stone circles is not particularly precise in most cases but the general consensus is that they are likely to date to the Late Neolithic around or shortly after 3000 BC. Stonehenge's Aubrey Holes can be dated closely to 3080–2890 cal BC, within the same chronological bracket as its enclosing ditch and bank (3000–2920 cal BC; Darvill *et al.* 2012). OSL dates from the ditch around the Ring of Brodgar place its construction probably slightly later than that of Stonehenge stage 1 in the mid-third millennium BC (Downes *et al.* 2013: 112–3; Griffiths and Richards 2013: 189). A similar estimate (c.2600–2000 BC) to that for Brodgar is proposed for the outer ring at Avebury, although some of its stones may have been re-set at a later date (Pollard and Cleal 2004). There is no absolute dating evidence for Stanton Drew or Long Meg and her Daughters, though the passage grave art on Long Meg could have been applied prior to 3000 BC; whether this circle was erected at that time or much later is unknown.

Dating of Waun Mawn is in progress. The only carbonised materials recovered from the fills of the stone sockets were tiny pieces of wood charcoal, mostly of oak and hazel. Some of these are large enough for radiocarbon-dating. The sediments filling the stone sockets are also being dated by optically stimulated luminescence (OSL).

Significant gaps in Waun Mawn stone circle have been detected along the northwest (over 22m), in the northeast (13m), in the east (over 12m), and in the southwest (over 10m either side of stonehole 091). Similar and even wider gaps are known at Stanton Drew and the Ring of Brodgar and, to a lesser extent, at Long Meg and her Daughters and Avebury. Yet the gaps along Waun Mawn's west and south circumference may hint that this stone circle was never completed. Of course, if the line of stoneholes had varied by more than 2m beyond the average diameter of 110m then they would have fallen outside several of our trenches. We cannot thus be certain that the stone circle was never completed. Only future excavation will resolve this.

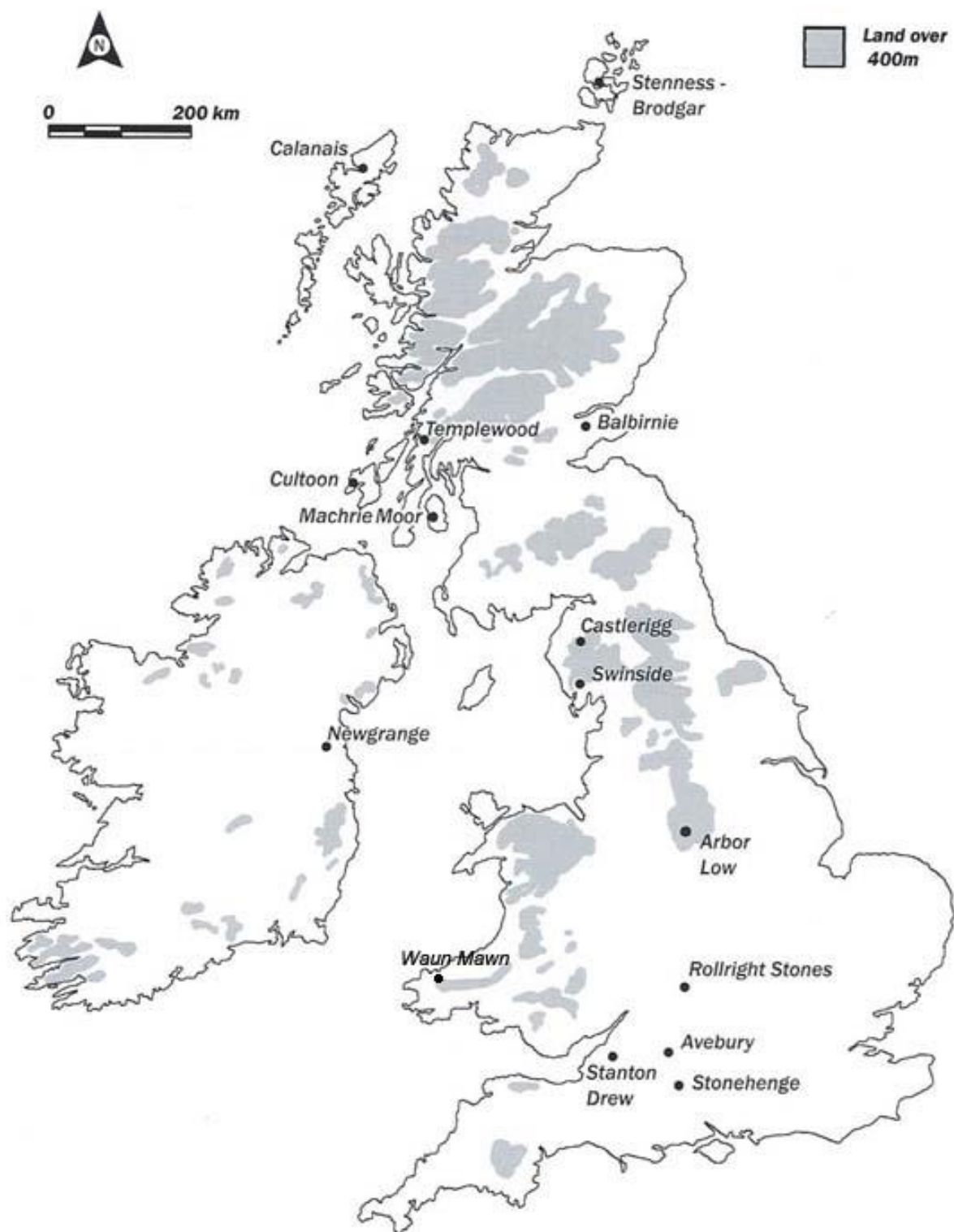


Figure 7. The great stone circles of Britain.

Three of the four monoliths still present at Waun Mawn are of unspotted dolerite. The fourth, the small recumbent stone in Trench 4, is of a 'speckled' type of spotted dolerite, matched by the outcrop of Mynydd-bach, 3.5km southeast of Waun Mawn. The large flake thought to have become detached from the large standing stone within stonehole 091 is of unspotted dolerite.

The pentagonal-sided imprint of the standing stone is highly unusual and can be matched in size and shape by just two bluestones at Stonehenge. One of these, Stone 62, is also of unspotted dolerite. Quite possibly, Stone 62 is the stone that stood originally in stonehole 091 at Waun Mawn. The fact that Waun Mawn stone circle has the same diameter as the perimeter ditch of Stonehenge is also highly suggestive of a close link between these two monuments. No other Neolithic monument in Britain shares this same diameter.

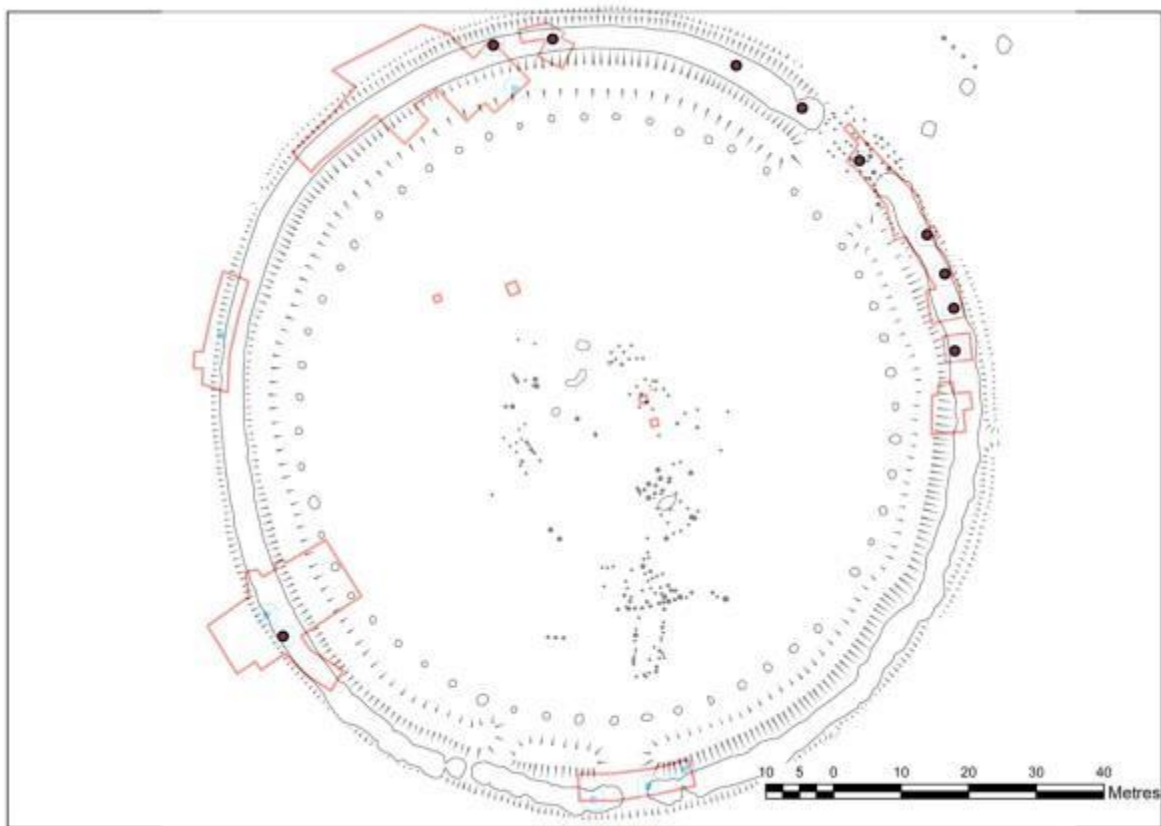


Figure 8. The stones and stone sockets of Waun Mawn overlaid on the plan of Stonehenge stage 1. These are the only two Neolithic monuments in Britain known to share the same diameter of c.110m.

Whilst Waun Mawn may have held some of the bluestones that were later erected at Stonehenge, it almost certainly never held all of them. Geological analysis of Stonehenge's Altar Stone reveals that it probably originated in the Devonian sandstones of the Senni Formation of the Brecon region of south Wales (Ixer and Turner 2007; Ixer et al. 2017). Thus it is unlikely to have been brought from there to the Preseli Hills and to Waun Mawn. It might well have come from a separate megalithic monument near Brecon. Similarly, Waun Mawn could have been just one of several stone circles in Preseli from which bluestones were taken to Stonehenge.

The confirmation of Waun Mawn as one of Britain's former great stone circles changes our understanding of the considerable significance of the Preseli region during the Middle–Late Neolithic. The importance of north Pembrokeshire in the Early Neolithic has long been recognised on the basis of the extraordinary concentration of portal dolmens and other megalithic tombs in this area (Lynch 1972; Barker 1992), recently enhanced by Darvill and Wainwright's excavations of a causewayed enclosure at Banc Du (Darvill *et al.* 2005: 22–3; 2007; Darvill and Wainwright 2016: 75–6) and a palisaded enclosure at Dryslwyn (Darvill and Wainwright 2016: 76).

Around 3000 BC, there was further activity both at the bluestone megalith quarries of Craig Rhos-y-felin and Carn Goedog (Parker Pearson *et al.* in press) as well as at the Banc Du causewayed enclosure where its ditch was re-cut in 3105–2915 cal BC (Darvill *et al.* 2005: 22–3; 2007; Darvill & Wainwright 2016: 75–6; Whittle *et al.* 2011: 526–7), coinciding with the ending of megalith-quarrying at Carn Goedog and with the erection of bluestones in the Aubrey Holes at Stonehenge. The recognition that Britain's third largest stone circle was built here in Preseli, a stone's pull from two bluestone quarries, leaves us in no doubt that this was one of the great religious and political centres of Neolithic Britain when the bluestones were taken to Stonehenge. Whether Waun Mawn stone circle was left unfinished may give us a major clue to the social circumstances that led to the remarkable decision to move up to 80 bluestones to Stonehenge.

Ongoing plans

The Waun Mawn results are extremely encouraging, confirming the existence of a bluestone circle dismantled in prehistory, very likely to be one of the monuments from which Stonehenge was built. When the full analyses of scientific dating and geological analysis are completed, we plan an interim publication on these exciting results in the international journal *Antiquity*.

No further excavations are planned in 2019 but we hope to return for another season of excavation in 2020. In 2019 the project's archaeo-astronomer, Prof. Clive Ruggles will analyse the stone circle's astronomical attributes to establish whether it was oriented towards midsummer solstice sunrise or northern major moonrise.

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