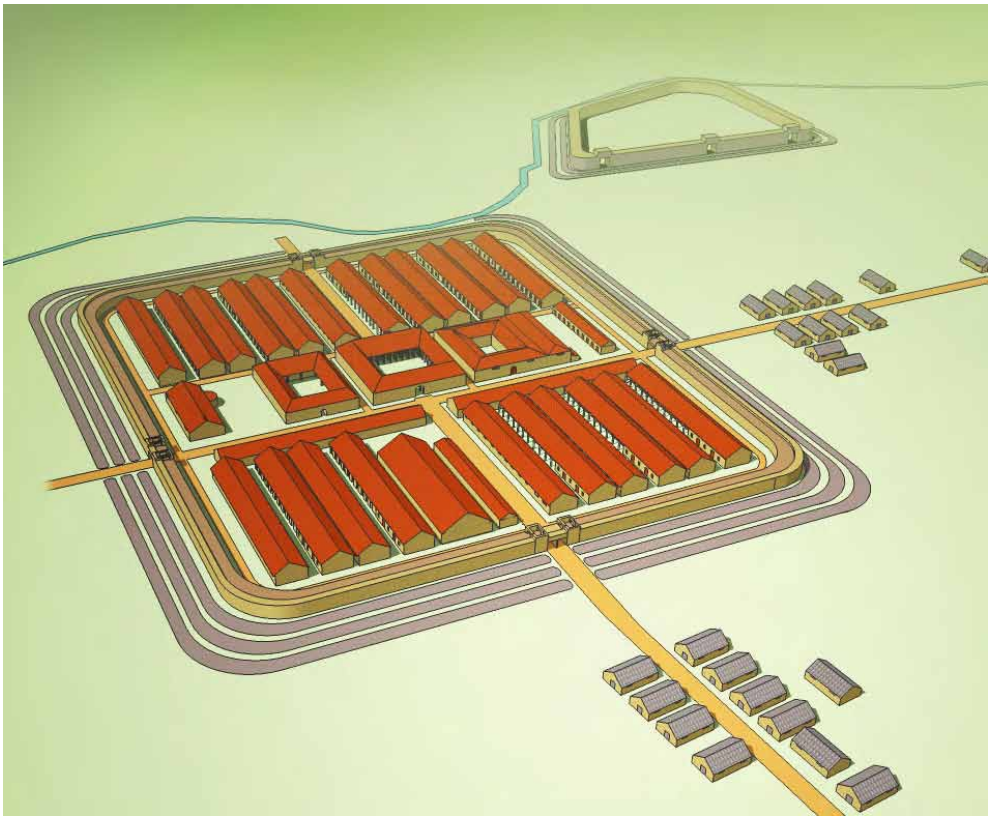
GEOPHYSICAL SURVEY AT LLANFOR IN RESPONSE TO THE 2009 EISTEDDFOD

G1995/G2091

Report 760 revision 2



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February 2010

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Prepared for Cadw
by

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GEOPHYSICAL SURVEY AND WATCHING BRIEFS AT LLANFOR IN RESPONSE TO THE 2009 EISTEDDFOD (G1995/G2091)

1. INTRODUCTION

In the dry summers of 1975 and 1976, a series of parch-marks in permanent pasture revealed a previously unknown Roman military complex (Frere and St Joseph 1983). The siting of the 1997 National Eisteddfod on the site prompted further study of the aerial photographs and a program of geophysical survey (Crew 1997). The geophysical survey was carried out by Gwynedd Archaeological Trust and Engineering Archaeological Services and covered a block of three fields to the south of the A494. This confirmed and added to the already detailed crop-mark evidence over much of the site. The earliest Roman features comprise a large (11 ha.) temporary camp with another camp overlapping its north-west corner. A later, 3.8 ha. fort was identified on aerial photographs along with a polygonal enclosure. The fort was not included in the geophysical survey but a series of rectangular anomalies containing possible hearths was identified alongside the road leading from its north-west gate. These features appear to represent a timber built *vicus.* A rectangular enclosure containing a single building, probably of Roman or Early Mediaeval date, was also detected. Further geophysical surveys, examining the fort, were carried out by Gwynedd Archaeological Trust and John Burman in 2002 and 2006 as part of the Cadw grant-aided Roman Fort Environs project. The surveys produced a remarkably detailed plan of the fort. A subsequent trial survey carried out in 2006 demonstrated that considerably more detail could be resolved by doubling the resolution.

There is no direct dating evidence for the complex but it is presumed that it predates the nearby fort of Caer Gai. As Caer Gai was founded around AD 75, it seems likely that these features date from either the pre-Flavian or very early Flavian campaigns.

2. AIMS OF THE SURVEY AND WATCHING BRIEFS

The 2009 National Eisteddfod was held on the fields to the north of the fort and there are also proposals to use the Llanfor site as a permanent site for future Eisteddfodau. This has the potential to cause cumulative damage to the buried archaeology due to the excavation of ground anchors and service trenches. Another potential side-effect of such intensive use of the area is an increase in magnetic contamination from such items as ring-pulls, coins and screws all of which could compromise any future gradiometer surveys. Part of the mitigation for the 2009 National Eisteddfod was therefore to carry out a gradiometer survey of all potentially affected areas and to complete, as far as possible, the survey of the complete Roman military complex including a high resolution survey of the fort, polygonal enclosure and *vici*. This should ensure that the fort and its environs are recorded at an appropriate resolution and can be seen in the context of the wider landscape. It was also decided to resurvey the three fields containing the Eisteddfod Maes in order to investigate levels of disturbance and magnetic contamination caused by the 1997 event and then resurvey 3 sample areas after the 2009 Eisteddfod to assess additional levels of contamination. The project was carried out in three phases the first in September 2008, the second in May and June 2009 and the third in February 2010. Interim reports were produced for the first two phase (GAT report 760 and 760 revision 1, Hopewell 2008 and Hopewell and Flook 2009). The present report incorporates the results from all phases and replaces the previous reports.

2. 1 Methodology

2.1.1 Phase 1:

Three fields were surveyed at a resolution of 1.0 x 0.5m using a Bartington Grad 601 twin sensor fluxgate gradiometer and a Geoscan FM36. Two of the fields, with areas of 5.4 and 5.1 ha, are located to the north of the current main road and contain parts of the two temporary camps.

The third field (7 ha) lies immediately to the north-east of the fort and contains the eastern *vicus* and rectangular enclosure. Approximately 1 ha of this had previously been surveyed in 2002. The current survey was orientated in the same direction and overlapped this by 10m ensuring that the two surveys could be combined.

A fourth area covered the interior of the fort. This was orientated in order to allow the incorporation of the trial survey of 2006. An area of about 3 ha was surveyed at a resolution of 0.5m x 0.25m.

2.1.2 Phase 2:

The three fields covered by the Eisteddfod Maes (10.7 ha) were re-surveyed at a resolution of 1.0m x 0.5m. An area of 4.6ha was then surveyed at a resolution of 0.5m x 0.25m. This contained most of the north-eastern *vicus* and the polygonal enclosure.

Several small excavations were carried out by the contractors during the construction of 2009 Eisteddfod. A series of watching briefs was carried out during significant ground disturbance.

2.1.3 Phase 3:

Two areas of 0.44 ha and 1.34 ha, covering the remaining parts of the *vici*, were surveyed at a resolution of 0.5m x 0.25m. This completed the high resolution survey of the fort, polygonal enclosure and *vici*.

Two areas of 1.0 ha and one area of 0.36 ha were surveyed at a resolution of 1.0m x 0.25m in the area of the Eisteddfod Maes in order to monitor magnetic contamination levels.

Small test pits were dug in order to recover soil samples and identify the source of the magnetic contamination.

3. RESULTS (PHASE 1), GRADIOMETER SURVEY OF THE FORT AND ITS ENVIRONS

3.1. The high resolution survey of the fort

The 0.5m x 0.25m resolution survey revealed a greater level of detail than the 2002 survey revealing the form and function of some of the less clearly-defined buildings. The data on the grey-scale plan (Fig. 1) has been processed using a high-pass filter in order to remove some of the large-scale variations caused by the underlying natural substrate.

The survey revealed an exceptionally detailed plan of the interior of the fort. The series of faint anomalies in the fort interior are clearly a product of the foundation trenches and post-holes of wooden buildings, along with internal drains and roads. The various elements of the survey are analysed below and are shown on the interpretation diagram (Fig. 2).

3.1.1 The fort defences

The fort is close to square with dimensions of 202m x 184 including the ramparts and covering an area of 3.86 ha. The outer defences consist of three ditches (1, 2, and 3) on all sides apart from the northern part of the western defences. A steep banked stream currently runs alongside the fort at this point and it may have been impossible to dig the outer ditch in sloping ground, which would itself have formed a natural defensive feature. The geophysics clearly shows that the outer ditch is missing here but, due to the effect of modern field boundaries and sheep pens, cannot show the exact point of its terminus. The inner ditch can be traced across the *porta decumana* and the *porta principalis dextra* but not the other two gates. The ditch was presumably bridged at these two points.

The ramparts (4) are visible on the survey as a 6m wide anomaly containing a great variety of positive and negative readings. Some patches of stronger signals suggest burning. The width of the rampart suggests a simple turf and earth construction although occasional lines of possible burning on the inner and outer faces could indicate timber or turf revetments. Two groups of six anomalies (5) at the end of the rampart at the *porta praetoria* indicate the postholes of gate towers. A posthole between the gates probably indicates a twin-portalled construction. Less clearly defined towers are evident at the other three gates.

3.1.2 Internal drains

Well-defined linear anomalies run alongside the *via principalis*, the *via praetoria*, the *via quintana*, and another minor internal road. These are best interpreted as drains.

3.1.3 The Latera Praetorii (central range)

The central range of buildings has produced particularly clear results. The *principia* or headquarters building (6) with dimension of 37.5m x 34.6m follows the same layout as Pen Llystyn (Hogg 1968) but is about 10m wider. The colonnaded courtyard and the cross hall are defined by a series of anomalies produced by large post-holes. A rear range of seven rooms opening onto the courtyard is also well defined.

To the south of the *principia* is another colonnaded courtyard building with dimensions of 34.9m x 28.0m and an entrance onto the *via principalis* (7). This is presumably the *praetorium* (commander's house) and is very similar in layout and size to that at Pen Llystyn, with a central colonnaded courtyard surrounded by a single range of rooms on three sides and two ranges at the rear. Many of the rooms appear to contain further subdivisions. A very strong anomaly in one of the rooms at the rear could indicate an oven in a kitchen.

A somewhat irregular and complex building (8) with dimensions of 39.7 x 33.9m, can be seen to the north of the *principia*. The exact layout of the building is difficult to trace but there are clearly many small rooms and a collection of post holes in the southern part of the building could indicate a courtyard. The rather irregular layout of the building suggests that it could be a *fabrica* (workshop). Many examples e.g. Valkenburg 1 and Oberstimm 1b (Johnson 1983) include a courtyard, usually containing a water tank. The other large building that could be found at this point in a fort is a hospital. These are generally well planned, regular courtyard or corridor buildings. Building 8 appears to be too irregular to be interpreted as such. Three evenly-spaced hearth type anomalies, aligned with, and thus suggesting that they are contemporary with, the building could indicate metalworking hearths. A small roughly square extension at the north-east appears to overlap one wall and could be later addition.

To the north of the possible *fabrica* lies a magnetically quiet area (9), containing two thermoremnant anomalies, probably ovens or hearths. This could be interpreted as a yard. At the north of the *latera praetorii* stands a well defined building of uncertain function (10) containing a range of 10 small rooms opening onto what appears to be a corridor on the south side.

At the south of *latera praetorii* is a three roomed building (11) with strong thermoremnant anomalies in the western side. The western room appears to have one apsidal end. It could be suggested that this is an internal bathhouse. This speculative interpretation is supported by the fact that most of the area around the fort and above the flood plain of the river has been surveyed and no external bathhouse has been identified.

3.1.4 The retentura (rear section)

The *retentura* is occupied by two blocks of six buildings with typical dimensions of 55m x 9m (12) resembling *centuriae* (barracks). Recent work on the 2nd-century forts at Wallsend and South Shields and in several fort buildings in the German provinces have however recognised a class of buildings interpreted as stable-barracks (Hodgson and Bidwell 2004, 131-6, fig. 1). They consist of one row of rooms designed to stable horses along with one row of conventional *contubernia*, housing troopers. Officers' quarters would stand at one end as in a standard barrack building. The individual stable compartments each contained an elongated pit designed to catch horse urine. This arrangement is clearly visible in the survey of the buildings at Llanfor, with the pits occurring in only one side thus defining the stables. The stables were orientated in pairs across side roads containing drains. The examples from Wallsend and South Shields contained nine *contubernia*. Unfortunately the buildings at Llanfor are cut by a field boundary making it difficult to assess the number. The northernmost barracks are the only examples where the troopers' quarters are undisturbed and, although not entirely clear, there are at least ten and probably eleven stable-contubernia pairs here.

The officers' quarters were subdivided into several rooms and contained a large hearth in the corner producing a characteristic double anomaly in the paired buildings. The design of the officers' quarters varies from block to block. The two adjacent to the via decumana are wider than elsewhere and the subdivisions appear to be different in every building.

3.1.5 The praetentura (front section)

The northern quadrant of the *praetentura* contains a block of 6 barracks (13). These appear to be standard infantry barracks with dimensions of 58m x 9m. They are laid out with single buildings at the north and south and two pairs in the centre. The officers' quarters are adjacent to the ramparts and have dimensions of 18.6m x 9.0m. They have one room arranged laterally at the inner end. The outer end is divided longitudinally into two with further subdivisions producing a range of four rooms at the front and a larger room at the rear. The rear room may also be subdivided in some cases. The men's accommodation is divided into ten *contubernia* each with a larger (3m x 4m) room for sleeping (*papilio*) at the rear and a small (3m x 2) storage room (*arma*) at the front. A well-defined line of post holes show that the contubernia opened onto a veranda. A small extension appears to have been built onto the rear (i.e. facing the *via praetoria*) of the southernmost barrack.

A large *horreum* (granary) with dimensions of 47m x 18m, defined by parallel slots for the floor supports (14), stands to the south of the *via praetoria*. A substantial anomaly with high magnetic readings can be seen in the southern part suggesting that it may have been damaged by fire.

To the south of the granary are what appear to be further barracks (15) laid out with single buildings at the north and south and a pair in the centre. These buildings produced faint anomalies but their general structure is visible. These are superficially similar to the barracks at the north of the *praetentura* but have equal sized pairs of rooms in the contubernia, no verandas and little or no differentiation between the troopers' and officers' quarters. Definite interpretation is problematic, they may have housed a different type of unit to those at the north or possibly performed a different function altogether.

A road running parallel to the *via principalis* divides the barracks from a further range of buildings (16), also running parallel to the *via principalis*. These comprise two blocks containing a series of 14 rectangular rooms each with dimensions of about 7m x 4m, many containing small hearths, and each opening towards the *via principalis*. A likely parallel would be buildings interpreted as *tabernae* flanking the major streets found at Inchtuthil and other legionary fortresses. A further row of slightly smaller *tabernae* (17) were detected to the north of the granary, opening on to the *via praetoria*.

3.2 The fort environs

A large area containing sites from many periods was surveyed around the fort. The results are shown on Figs 3, 4 and 5 and the numbering sequence continues from Fig 2. The post 1997 Eisteddfod surveys of the area occupied by the Maes i.e. the three fields between the fort and the A494 road contained significant areas of ferrous contamination (see below for further details). Part of this area was, however, surveyed at a higher resolution thus producing much clearer results. Figs 3and 5 incorporate data from both the 1997, 2009 and 2010 surveys. The later, higher resolution, data is used where possible but the areas of ferrous contamination have been manually edited out using Adobe Photoshop image processing software and replaced with the lower resolution 1997 data.

The earliest features are two circular Bronze Age barrows (18 and 19) 26m and 23m in diameter. Crew (1997) suggests that there is another smaller barrow with concentric ditches and a series of cremation pits midway between the two larger barrows. This is mostly based on aerial photographic evidence, although some small magnetic anomalies correspond to the possible pits and the inner ditch is just visible (20). Two parallel rows of pits (21) were detected in Crew's survey. Each row contains five pits and is 25m long, with a separation between the rows of 9.5m. These were interpreted as being a prehistoric pit alignment. One pit was excavated during the watching brief for the 1997 National Eisteddfod (Crew 1997) and a post-pit some 80 cm in diameter was identified and excavated. No dating evidence was recovered. One further anomaly to the north east could be a further pit but there is however nothing in the latest survey to suggest that the alignment continues beyond the field boundary.

A range of Roman features extend across the survey. Most noticeable is a polygonal enclosure (22) measuring 147m by 101m and enclosing 1.2ha (3 acres). The enclosure was heavily defended by a double ditch array and rampart. Three gateways defended by four-posted gate towers were set in the north-east side. Two rectangular features on the south side were surveyed at high resolution during the 1997 and 2009 surveys. Both appear to have been timber-framed buildings, the easternmost exhibiting a series of parallel foundation trenches suggesting that it was a *horreum*. A 30m square feature (52) with rounded corners also lies within the polygonal enclosure. This is bounded by parallel slots or narrow ditches and contains very faint internal features. Its rounded corners suggest that it is Roman although it is not necessarily contemporary with the enclosure. It could tentatively be interpreted as a signal station. The polygonal enclosure has been variously interpreted as a supply base, storage compound or construction compound.

The road running from the *porta principalis sinistra* to the north of the fort is visible as a faint anomaly (23) flanked by hearths and rectangular buildings indicating the presence of a *vicus*. Most of the rectangular buildings contain a small rectangular feature of unknown function in one of the corners farthest from the road. The road can be traced for 140m with certainty. Several additional anomalies on this alignment (24) suggest that the road and *vicus* extend at least 220m from the fort. The survey results at its northern extent are however less clear due to ridge and furrow and a sample area surveyed at high resolution did not identify any surviving walls associated with the hearths. A further road running north-east from the *porta praetoria* (26) is principally defined by a scattering of hearths to either side. The high resolution survey showed that most of the hearths occur within very faint rectangular anomalies indicate further *vicus* buildings. One of the buildings to the north of the road has dimensions of at least 11m x 50m, with its longest side parallel to the road, and is divided up into 8 narrow compartments. This differs from the more usual rectangular buildings with their narrow ends to the road identified in the north-western *vicus* and more closely resembles the buildings within the fort. This may indicate that it had an official function. Complex buildings presumably performing a similar function have been identified adjacent to forts in several *vici* (e.g. Cefn Caer, Hopewell and Burman 2007). The *vici* at Llanfor are much more sparse that at Canovium and Cefn Caer and only appear to contain a single phase, presumably reflecting a short period of occupation.

Two large temporary camps were detected to the north of the fort (Llanfor I and Llanfor II, Davies 2006). The first (27) overlaps the defences of the fort and polygonal enclosure and has dimensions of 420m x 290m. It is roughly rectangular, being wider at the south. It should be noted that the published plans of this camp in Crew 1997 and Davies 2006 show the northern side at an incorrect angle. Opposed centrally placed entrances are visible in the northern and southern ends. A further entrance is visible on the two thirds of the way along the western side. Crew suggests that there is second entrance close to the overlap with the polygonal enclosure but a slightly clearer re-survey of the area by John Burman suggests that this is not the case. This also supported by the observation that there is also no opposing entrance on the eastern side. The camp ditch deviates around one of the bronze-age barrows suggesting that it was a substantial mound when the camp was constructed. Excavation (Hopewell 2007) has shown that the camp predates the fort and it also appears to predate the polygonal enclosure, one side of which is aligned on the camp's defences. A line of thermoremnant anomalies (25) are not obviously aligned with the fort gates and may be associated with activity within the camp. There are also further similar anomalies scattered elsewhere within the camp. It is usually assumed that there will be no significant archaeology in a temporary camp. Recent work at the marching camp at Deers Den, Kintore, Aberdeenshire indicates that this assumption should be re-examined. Excavation revealed 180 bread ovens, some with multiple firings, along with numerous rubbish pits (Cook and Dunbar 2008).

The southernmost camp is overlapped at the north by a second camp (28). The full extent of this was not revealed by the survey but it is 292m wide and at least 240m long. Davies assumed that it did not continue beyond the north end of the field because there is a very steep slope at this point. The line of the ditches however continue to the foot of the slope and presumably continue to the north-west. The ditch appears to be less substantial than that of Llanfor I and is only intermittently visible as a narrow anomaly which is lost as it runs up the slope on the western side. No entrances can be reliably traced. It should also be noted that Roman ovens were identified a few metres to the west of the camp during water main renewals in 2006 (Dodd, 2006).

Four small circular anomalies (29 and 30 and 51) were detected all with a diameter of 6.5m. All appear to contain a small central anomaly. One lies at the top of a break of slope above the Dee flood plain,

one lies at the bottom of a slope at the north west of the survey and two lie within the polygonal enclosure. Interpretation is somewhat problematic; they are smaller than a typical prehistoric barrow and a bit smaller than an anomaly produced by a typical eaves-drip gully from a roundhouse. A similar sized feature was revealed as a parchmark on RCAHMW AP2006 4020 a few metres from the edge of the break of slope above the flood plain to the south-east of the fort. This is clearly penannular and could be interpreted as a roundhouse. Unfortunately this cannot be seen on the geophysical survey due to the presence of an adjacent post-medieval brick kiln. The distribution of these features and the lack of associated enclosures do not however suggest typical roundhouse settlement. A possible alternative interpretation could be Roman barrows such as those found at Petty Knowes, High Rochester (Charlton and Mitcheson 1984). These burials comprised a main cemetery of around seventy-five barrows, along with clusters of outliers. Most barrows consisted of a low circular earth mound surrounded by a shallow ditch and bank were between 3m and 5m in diameter.

A sharp-cornered rectangular ditched enclosure (31) with an entrance in the north-western side produced a clear anomaly at the eastern side of the survey. Three sides of the enclosure were detected, the third presumably ran along the current hedge line. The entrance is probably centrally placed so the dimensions of the enclosure can be projected as 62m x 72m. A series of post-holes (32) in the western corner define a rectangular building with dimensions of 7m x 13.5. Crew (1997) carried out a high resolution survey of the building and revealed six somewhat unevenly placed postholes on each side, a centrally placed post on each of the narrow ends and an internal posthole perhaps indicating an internal division. Double slightly offset postholes on the north-east side were interpreted as an entrance. The current survey added little to this although the internal division may incorporate two post holes. The site is currently being investigated by Tudur Davies a post-graduate student at Sheffield. Two trial trenches were excavated and both are visible on the survey (33). There seem to be no obvious parallels for this site in north Wales although an Roman or early-medieval date is likely. Ongoing work could produce a radio-carbon date for this feature.

A linear feature (34) running from the present main road towards Llanfor village is probably an early road. A Roman date is unlikely because it seems to run towards Llanfor church as opposed top taking a more direct route. Two large anomalies on either side are probably quarry pits. The line of the road appears to continue around the northern side of the churchyard. A later phase of the road (35) connecting to the superseded Pont Llanfor produced a substantial anomaly. A footpath (36), visible as a narrow raised earthwork, also runs across the same field.

A series of field systems and plough marks can be seen across the whole of the survey areas. The most obvious is a system (37 indicated in green) that includes some of the present boundaries and was somewhat better preserved in the late 19th century (Ordnance Survey 25" 1888). The parallel lines of ridge and furrow in the fields to the south of the main road and the curving and in some cases s-shaped to the east of this indicate a field system that originated with medieval Llanfor and has survived in part to the present day. This appears to overlie a series of other boundaries (38 shown in brown) some of which may predate the Roman features (Crew 1997). The fields to the north of the main road are crossed by one recently removed boundary (39) and parallel striations (40) that are probably a result of modern ploughing. These are crossed by somewhat diffuse curvilinear features (41) that could be earlier boundaries or possibly natural features.

A series of groups of fairly strong (up to +- 40nT) evenly sized anomalies occur in 4 places in the survey. The most obvious is (42) just to the north of the A494, a second group (43) occurs to the north of this and a third (44) in the easternmost field. A group of three similar anomalies (45) are aligned on the ditch of temporary camp 26. The cause of these anomalies is unclear, the high readings indicate magnetic enhancement and all have similar dimensions (typically 4m x 2m). Some are aligned with each other and others are randomly placed. The cluster (42) adjacent to the A494 implies modern material deposited to create an access. Cluster 41 seems to be aligned on a former field boundary. Three similar anomalies (45) are, however, aligned on a Roman ditch. Additional information from a different source is needed to interpret these features.

Other anomalies detected by the survey include a series of palaeochannels in the easternmost field (46, shown in light grey) that appear to predate the archaeological features, two undated thermoremnant anomalies (47) adjacent to the stream, an undated curvilinear anomaly (48), a post-medieval brickworks (49) and a modern cable trench (50).

3.3 Discussion

The fort at Llanfor has few parallels in Wales. It appears to be a single-phase construction as the survey revealed no evidence for rebuilding. This strongly suggests that it was short lived.
It appears to have been built entirely from wood and is about twice the size of any of the auxiliary forts that characterise the Flavian garrisoning of Wales.

The military complex remains poorly dated and few sites comparable to the fort have so far been positively identified which makes interpretation difficult. It can be presumed to have pre-dated the nearby Caer Gai fort which was founded *c*. AD 75-80 and must, therefore, relate to either the aborted pre-Flavian campaigning in north-west Wales or more probably to the early stages of the Flavian campaign. The few finds that have come from the site are not closely datable but suggest an early Flavian foundation. The latter hypothesis is supported by the discovery of early-Flavian pottery at the only similar site in Wales, Llwyn y Brain (Caersws 1) (Arnold & Davies 2000, 11). The fort at Llwyn y Brain was discovered by St Joseph on aerial photographs in 1957 (St Joseph 1977) but little is known about the details of the site. The size of the fort is, however, about the same as Llanfor, both cover about 3.8 ha and it also predates a nearby Flavian fort.

Llanfor's large size, densely-packed interior and large garrison clearly indicate a different function to the auxiliary forts in the region and probably reflect the requirements of a force active in the field during a period of campaigning as opposed to the more settled garrison found in later Flavian forts. The two large camps appear to predate the fort and polygonal compound and at least one (26) may be a construction camp. The alignment of this camp entrance with the fort entrance and the ditch with the defences of the polygonal enclosure implies some continuity.

The garrison of the fort is unknown but the barracks, arranged in groups of six, indicate the presence of six *turmae* of cavalry housed in the *retentura* and a cohort of infantry in the *sinistral* side of the *praetentura*, with a possibility of further infantry housed in the *dextral* side. It is not known if these were legionaries, auxiliaries or a mixture of the two, the barracks and other buildings are mid-way in size between examples found in auxiliary and legionary forts. The presence of *tabernae* alongside the main roads appears to be typically legionary. Davies (2005, 97-8) argues for vexillations from the nearest legionary bases at Chester or Wroxeter.

4. RESULTS (PHASE 2), ASSESSMENT OF THE IMPACT OF THE 1997 EISTEDDFOD AND WATCHING BRIEFS IN 2009

4.1 Geophysical Survey

Three fields were surveyed in advance of the 1997 Eisteddfod (Crew & Crew 1997, Fig. 6). These were resurveyed in 2009 at the same resolution (Fig. 7) in order to assess levels of disturbance and magnetic pollution. Fig. 8 shows the major changes detected by the survey and Fig. 9 relates them to the plan of the 1997 Eisteddfod. Two service trenches are clearly visible, and watching briefs were carried out by Peter Crew of the Snowdonia National Park these were excavated (ibid). The status of two other linear anomalies is unclear and they could be drains that, being parallel to the survey traverses, were processed out of the original SNP data using a zero mean traverse function. The Pavilion (a tent covering the main arena) was secured by ground anchors buried in narrow trenches; these were not detected by the gradiometer survey. A scatter of magnetic material was detected across most of the Maes. This included several concentrations of material, most of which corresponded to structures shown on the Eisteddfod plan (Fig. 9). The individual anomalies are mostly small magnetic dipoles, visible on Fig. 7 (inset 1) as small, half black, half white dots. These are best interpreted as small pieces of iron or steel. Fig.7 Inset 2 shows a sample area surveyed at high resolution after the installation of a temporary slate road. This produced a strong magnetic anomaly suggesting that some of the anomalies could also be the result of residues from temporary roads installed in 1997.

Three areas were resurveyed in 2010 in order to re-sample the magnetic contamination after the 2009 Eisteddfod (Fig 10). This allowed the build up of magnetic material to be recorded and analysed. Fig. 11 shows and differentiates between the magnetic material from 1997 and 2009. This demonstrates that both of the Eisteddfodau produced significant amounts of magnetic contamination. There were large amounts of refuse scattered around the Maes when the field work was carried out in 2010. Some

objects such as discarded scaffolding clamps, iron pins, locks, bottle tops, cans and other litter would have produced magnetic anomalies but these did not seem to account for the intensity of the contamination in most areas. Small test pits (c. 20cm x 20cm) were dug into the topsoil and soil samples were examined using the gradiometer sensors (see Fig 11). This revealed that the anomalies were caused by large numbers of wood screws, some in the upper layers of the turf and some incorporated in the topsoil to a depth of 10-15cm. The screws in the turf appeared to mostly be from 2009 and the more deeply buried examples from 1997 presumably buried during reseeding. The concentrations of screws corresponded to the location of temporary buildings and tents and would appear to have been discarded when wooden staging and floors were dismantled.

Analysis of the high resolution surveys showed that these areas also contained magnetic anomalies that had appeared during the 2009 Eisteddfod. These areas were within the caravan and camping areas. The magnetic contamination was less dense than in the Maes and consisted of larger widely spaced dipoles. Several of these were located using the gradiometer and were found to be *in situ* steel tent pegs. A scatter of smaller anomalies along the line of a temporary road (probably plastic matting) appeared to be small pieces of wire, perhaps from brushes used for cleaning or from contamination brought in from another site on the matting.

4.2 Eisteddfod 2009 Llanfor, Bala Watching Briefs (G2091)

As part of the archaeological response to the construction of the site for the 2009 Eisteddfod a series of 3 watching briefs was carried out during significant ground disturbance. This was not a comprehensive process but relied upon piecemeal notification by the site construction manager of impending works. The most significant ground disturbance monitored comprised a series of 6 pits excavated to take tanks to act as sumps for sewage for toilet blocks. It was planned to then pump the sewage to above ground holding tanks. This process was designed to reduce the amount of ground disturbance required for in-ground holding tanks which apparently was the previous method. All of these pits were located outside of the extent of the Scheduled Ancient Monument. In addition, one short length of earth bank field boundary outside the Schedule Monument Area was removed to provide access. This was recorded before disturbance, but the actual excavation was not monitored. GAT was not notified regarding any other ground disturbance and no other groundworks were monitored. Photographs were taken during the Eisteddfod of another earth bank field boundary which it was noted had been breached. From the site plan it is likely that field boundaries were breached in at least two other places. These would have been within the Scheduled Monument Area.

4.2.1 The Watching Briefs:

Three separate watching briefs were carried out to monitor and record any archaeological implications resulting from this work. All pits were designed to hold sewage sump tanks

Pit 1 (SSTP1) measured 2.6m long by 2.0m wide and was excavated to a depth of 1.3m. This pit seemed to reveal evidence of significant modern dumping with numerous modern finds of pottery and metalwork as well as buried branches and bricks down to virtually the bottom of the pit. The OS 1st edition 25" map of 1888 shows a curvilinear line running some distance to the S of the stream at the NE end of this field. This may indicate the limit of former high ground with the area to the NE by the stream possibly low lying and wet. This line is still present on the 1981 1:10000 OS map suggesting that this area was infilled quite recently. The current topsoil in this area was 0.2m thick.

Pit 2 was 3.3m long by 1.2m deep and 1.3m deep. It appeared to be excavated nearly totally within the extent of an earlier large deep feature. The fill of this feature was quite moist, poorly consolidated and contained occasional modern finds suggesting that this may have been a pit dug for the 1997 Eisteddfod. The SE section of the pit revealed a 'U' profiled ditch 0.63m deep and at least 1.0m wide. The fill suggests deliberate backfilling. The topsoil cover amounted to 0.2m in depth.

Pits 3 and 4 each contained what appeared to be an undisturbed soil profile with top soil to a depth of 0.25m.

Pit 5 measured 3.9m long by 1.1m wide and was observed down to a depth of 0.35m. At the extreme east end of the pit was, what appeared to be, a linear feature running NNW-SSE. The feature was only

partially revealed in the pit but was at least 0.8m wide with what appeared from limited probing to be a fairly shallow profile. There were moderate flecks and small fragments of charcoal in the fill. The top soil depth was 0.3m.

Pit 6 measured 2.8m long by 1.15m wide and was observed down to a depth of 0.4m. This revealed an undisturbed soil profile. The top soil depth was 0.3 – 0.35m.

4.2.2 Discussion

No features detected by the gradiometer survey were disturbed by the pits. The linear feature in pit 5 may be associated with the nearby field boundary. There was no significant disturbance of the feature and no further excavation was carried out. The area of infilled ground in pit 1 corresponds to an area of noise and strong magnetic responses on the gradiometer results that appears to be bounded by a palaeochannel of the stream, supporting the cartographic evidence that the area may have been wet and low-lying and has been infilled. Elsewhere the topsoil is between 0.2m and 0.35m deep indicating that any future disturbance below this level could damage archaeological horizons.

4.3 Eisteddfod 2009: other physical impacts

The fields formerly containing the main structures in the Maes and the works compound were in a poor state when the site was visited in February 2010 to carry out the geophysical survey. The areas occupied by the main temporary roads, which had been constructed from slate waste laid on geotextile, were compacted, bare of vegetation and contained standing water. A test pit dug in this area suggests that the compaction is worst close to the surface but has affected the full depth of the topsoil. The landowner now wishes to subsoil these fields to re-establish the drainage which would certainly severely damage the archaeological horizons.

The area of the Maes contained large amounts of refuse most of which appears to have been discarded during the dismantling of the Eisteddfod structures. In addition to the screws and other magnetic refuse noted above there were thousands of discarded cable ties along with lengths of wire and plastic trunking, pieces of geotextile, slate waste from the roads, glass and plastic bottles, broken toilets and other discarded equipment.

4.4 Overall Impact

The results of the re-survey along with information from the 1997 watching brief (Crew and Crew 1997) suggest that ground disturbance was confined to a few small trenches and one or two larger excavations associated with tanks at the toilet blocks. Some trenches were re-excavated for the 2009 Eisteddfod and additional tank excavations were also carried out. Consultation with GAT ensured that excavations were either restricted in depth and therefore confined to disturbance of the topsoil or monitored allowing watching briefs to be carried out during significant excavations. It was however noted during the work in 2010 that there had been several un-monitored excavations of unknown depth.

The watching briefs and supervision have minimised the physical impact on buried archaeology but there has been no coordinated programme of archaeological mitigation, particularly in areas outside the area of the Scheduled Ancient Monument, and some features have been disturbed. A service trench was cut through the pit rows (Fig.4 feature 21) in 1997. A watching brief and limited excavation was carried out by Peter Crew (ibid). A more serious threat is the cumulative impact around the main Pavilion. Ground anchors were inserted in trenches in 1997 and it was anchored by about nine hundred steel pins (about 35mm diameter) that were driven into the subsoil in 2009. This will have produced an impact on buried archaeological horizons. Of particular concern is the potential impact on the Roman road and *vicus* (feature 24) which will have been cut by two double lines of pins. The line of hearths detected in the survey demonstrated the survival of some stratigraphy so it must be assumed that Roman archaeological features have been damaged by the anchoring of the pavilion. The geophysical survey in this area did not produce particularly clear results due to the effects of ridge and furrow but it should be stressed, as a general principle, that geophysical survey cannot be taken to reveal all of the extant archaeology. The compression of the topsoil in the Maes is of particular concern. This may result in the area being subsoiled which will inevitably damage archaeological features including the pit-rows the temporary camps and part of the Roman road and *vicus.*

The contamination of the topsoil with magnetic material seriously compromised parts of the 2009 re-survey. Fortunately the worst contamination was in the north-western and north-eastern fields away from the most sensitive archaeology. This allowed a high resolution survey of the *vicus* and polygonal enclosure to be carried out in advance of the 2009 Eisteddfod which has been shown to have produced further magnetic contamination. The extent of the contamination was unforeseen and was fortunately somewhat mitigated by the 1997 survey which allows differentiation between archaeology and modern anomalies. There are however some areas, particularly in the north-eastern field, where the quality of further survey would be seriously degraded by dense contamination that would mask weaker archaeological anomalies. There had clearly been no attempt to clear rubbish from the site after the temporary buildings and tents had been dismantled. This has added to the magnetic and general contamination of the topsoil

It should also be noted that it cannot be assumed that all possible magnetic data has been recovered from the site; technological advances may allow more detailed investigation and integrated multiplatform surveys to be carried out in the future.

The magnetic contamination has presumably had little physical impact on the buried archaeology but has produced a strong impact on the potential for recovery of magnetic survey data across large parts of the site. The impact on the Llanfor complex has been lessened by the unusually comprehensive programme of surveys carried out over the last 12 years with significant amounts of data being recovered before the contamination. The findings of this study should be taken into account when siting similar large-scale temporary events on archaeologically sensitive areas.

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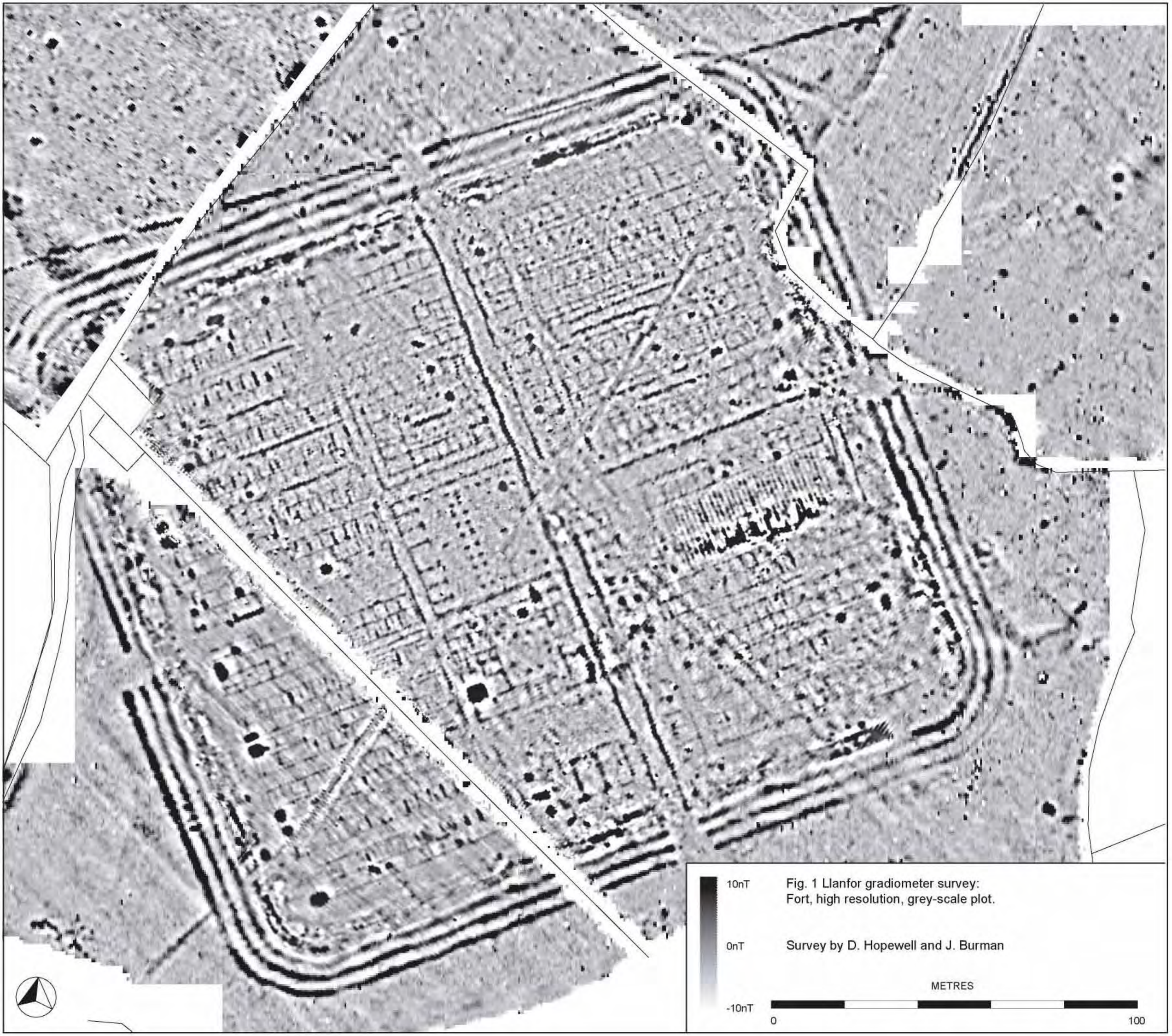

Fig. 1 Llanfor gradiometer survey:
Fort, high resolution, grey-scale plot.

Survey by D. Hopewell and J. Burman

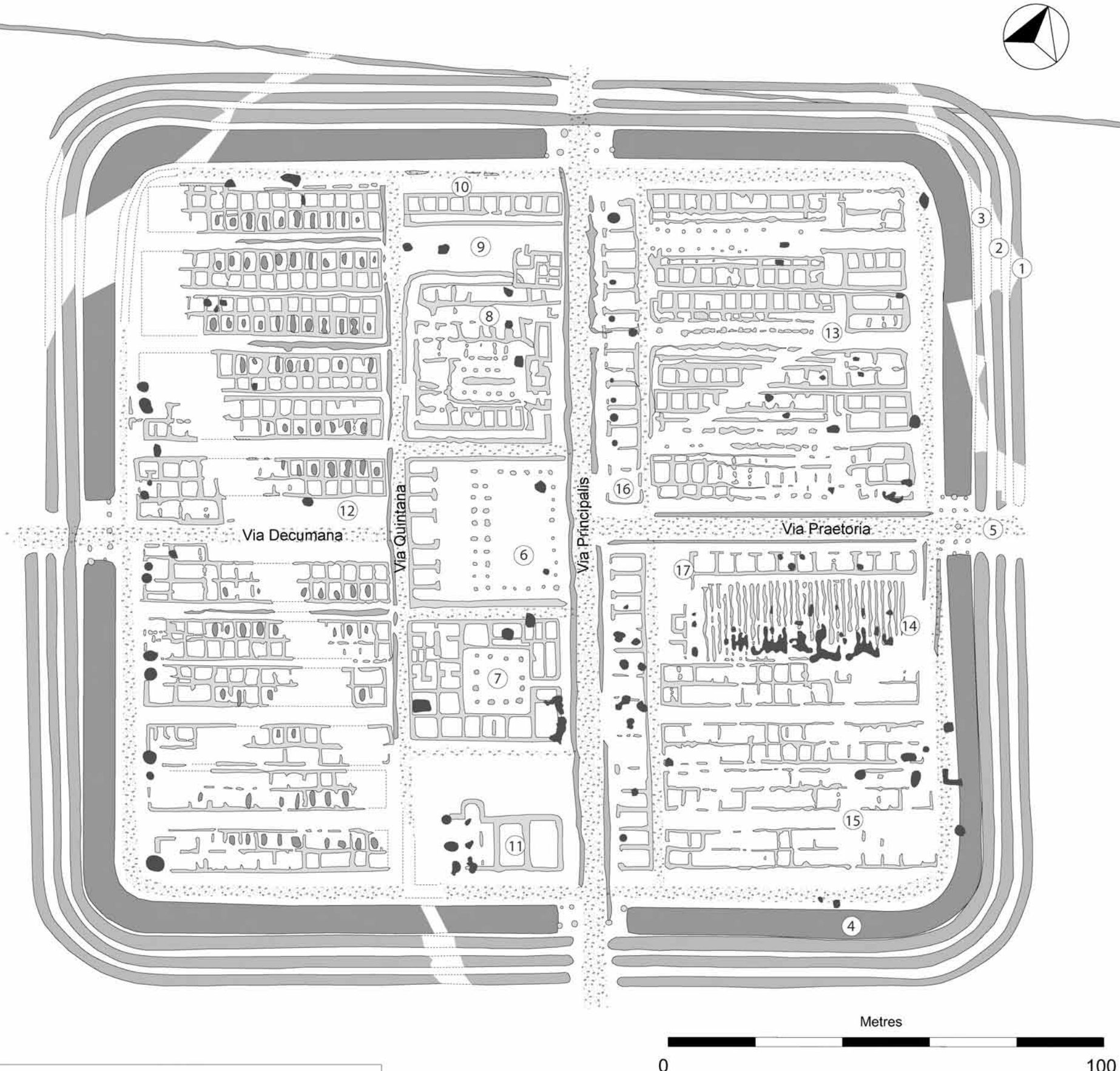

Fig. 2 Llanfor gradiometer survey: Fort interpretation

Church

LLANFOR

Pont Llanfor

A494

15nT

0nT

-15nT

Fig. 3 Llanfor gradiometer survey: Fort environs, grey-scale plot.

Survey by D. Hopewell, R. Flook and J. Burman

METRES

0 100

Church

LLANFOR

Pont Llanfor

A494

30 41 39 43 40 42 48 36 45 34 35 50 28 27 19 24 21 47 44 37 46 25 20 23 51 18 52 22 32 33 31 29 26 38 49

METRES

0 100

Fig. 4 Llanfor gradiometer survey: Fort environs, Interpretation.

Survey by D. Hopewell, R. Flook and J. Burman

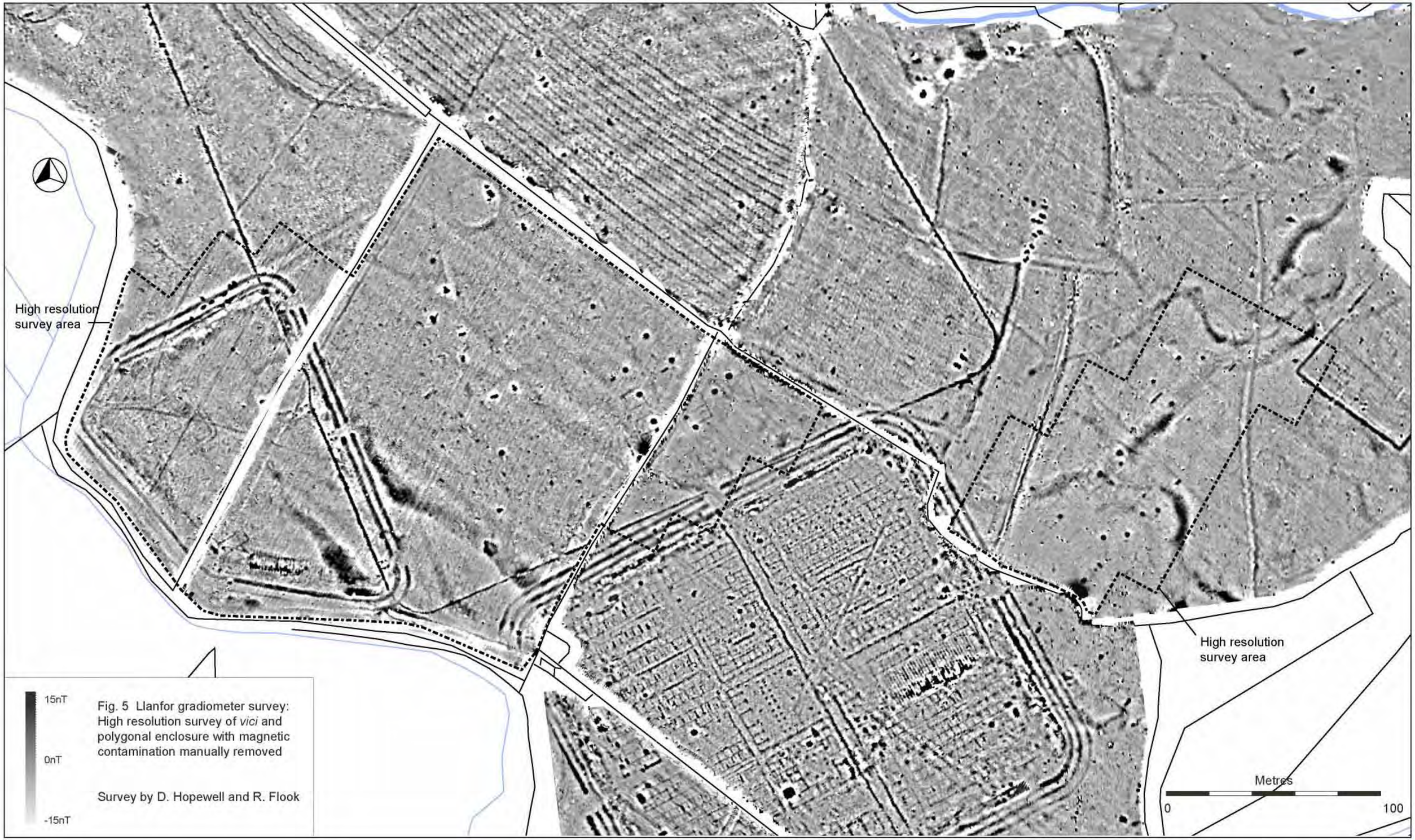

Fig. 5 Llanfor gradiometer survey: High resolution survey of *vici* and polygonal enclosure with magnetic contamination manually removed

Survey by D. Hopewell and R. Flook

A494

METRES

0 100

15nT

0nT

-15nT

Fig. 6 Llanfor gradiometer survey: Grey-scale plot, before1997 Eisteddfod

A494

2

1

Inset 2: showing slate road

Inset 1: high resolution

15nT

0nT

-15nT

METRES

0

100

Fig. 7 Llanfor gradiometer survey: Grey-scale plot, after 1997 Eisteddfod

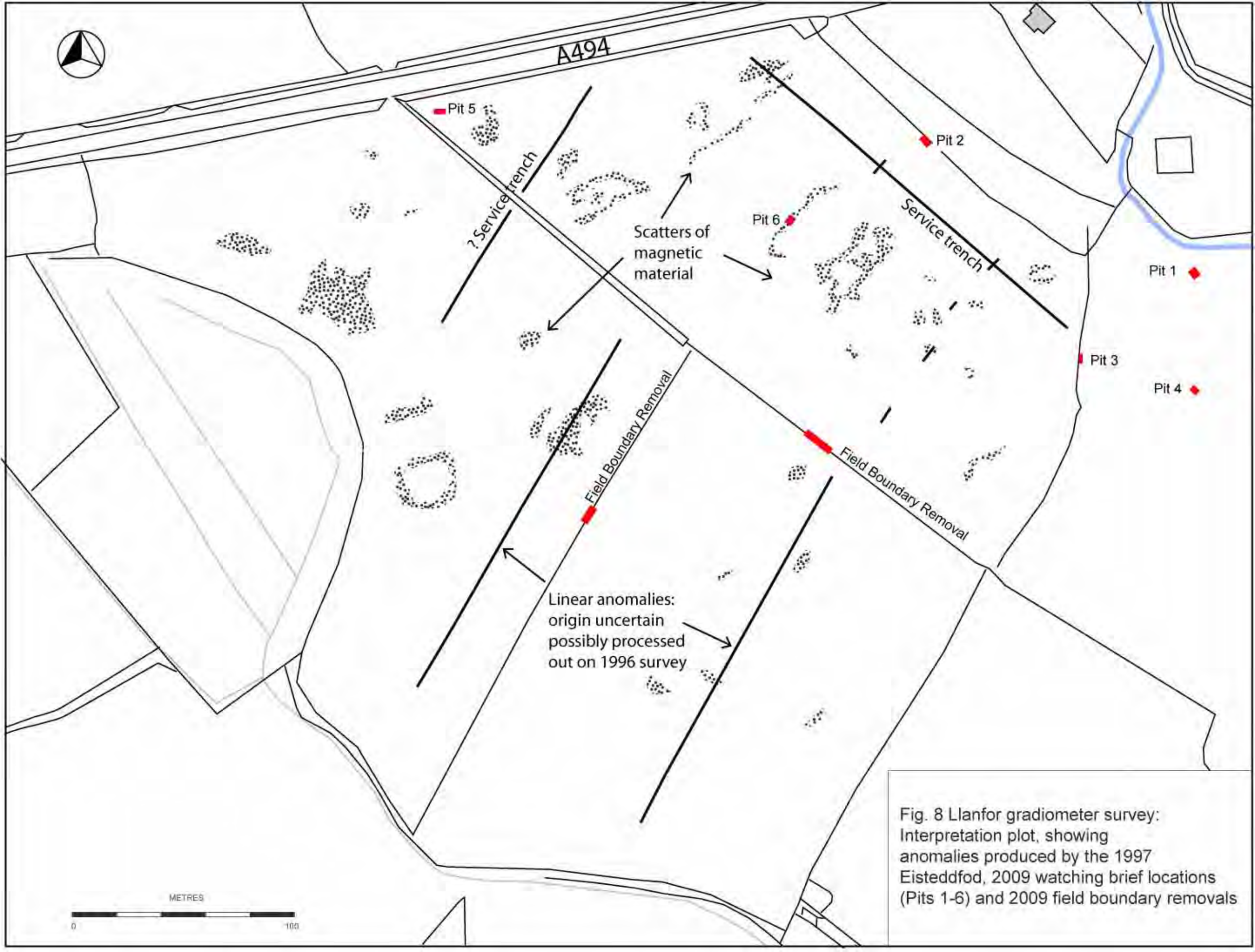

Fig. 8 Llanfor gradiometer survey: Interpretation plot, showing anomalies produced by the 1997 Eisteddfod, 2009 watching brief locations (Pits 1-6) and 2009 field boundary removals

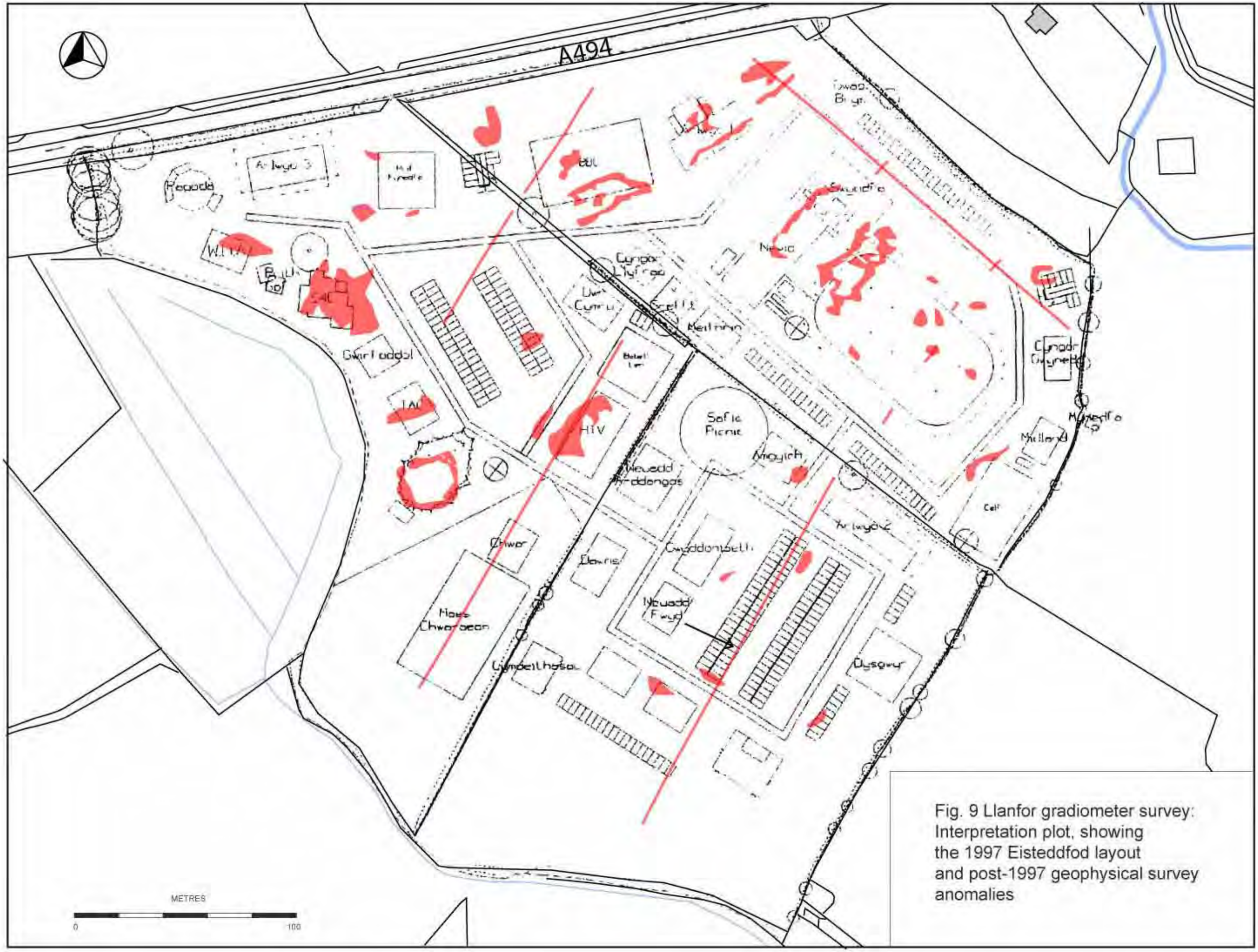

Fig. 9 Llanfor gradiometer survey: Interpretation plot, showing the 1997 Eisteddfod layout and post-1997 geophysical survey anomalies

A494

Area 1

Area 2

Area 3

15nT

0nT

-15nT

METRES

0

100

Fig. 10 Llanfor gradiometer survey: Grey-scale plot, sample areas after 2009 Eisteddfod

A494

Area 1

Sample 1

Sample 3

Sample 4

Area 2

Sample 2

Area 3

METRES

0

100

Fig. 11 Llanfor gradiometer survey: magnetic pollution analysis

Magnetic material from 1997

Magnetic material from 2009

High resolution survey area

15nT

0nT

-15nT

Metres

0

100

Fig. 12 Llanfor gradiometer survey: High resolution survey of *vici* after 2009 Eisteddfod with magnetic contamination included

Survey by D. Hopewell and R. Flook

High resolution
survey area

Metres

0

100

15nT

0nT

-15nT

Fig. 13 Llanfor gradiometer survey: High resolution survey of *vici* after 2009 Eisteddfod with areas of associated magnetic contamination indicated in red

Survey by D. Hopewell and R. Flook

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