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Final Effluent Scheme

Archaeological assessment
and field evaluation

GAT Project G1750a
Report no. 462
October 2002
Revised December 2003

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

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Report No. 462

Prepared for Symonds Group
by
A. Davidson and D. Hopewell

October 2002
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HOLYHEAD WTW IMPROVEMENTS

FINAL EFFLUENT SCHEME (G1750a)

ARCHAEOLOGICAL ASSESSMENT AND EVALUATION

SUMMARY
An archaeological assessment was carried out in advance of a new pipeline between the Waste Water Treatment Works at Penrhos, Holyhead and the outflow at Soldiers Point. This involved consultation of existing records and documents, a field search, and field evaluation. Seven archaeological features were identified: 4 were categorised as regional importance and 3 of minor importance. The pipeline will have a slight impact on 5 of these features, all of which are linear tracks or railways. Field evaluation has been undertaken on the possible site of a medieval chapel, which revealed the presence of a previously unknown stone lined pit, possibly of Bronze Age date, though did not locate the chapel. The proposed route also passes close to a Romano-British settlement, the full extent of which is not known. Geophysical survey was used to try and define the limits of the archaeological remains, but the technique was not successful because of previous disturbance and the presence of a gas pipeline. Appropriate mitigation is recommended. Those sites which will be slightly affected will be recorded in advance and, where possible, re-instated afterwards. A watching brief will be undertaken along the entire route during the initial earth removal process, and during trench excavation if it is considered appropriate.

1 INTRODUCTION

Gwynedd Archaeological Trust have been asked by Symonds Group Ltd to undertake an archaeological assessment in advance of a new pipeline between the Waste Water Treatment Works at Penrhos, Holyhead (SH25938135), and the outflow at Soldiers Point (SH23618361), a length of 5.5 Km. An initial report was submitted in October 2002 (GAT Report No. 462). This is a revised report taking into account minor variations in the route of the pipeline, and the results from additional evaluation work.

2 SPECIFICATION AND PROJECT DESIGN

No brief has been prepared for this work, but a project design was produced which conforms to the guidelines specified in *Standard and Guidance for Archaeological Desk-based Assessment* (Institute of Field Archaeologists, 1994, rev. 1999), and the project is being monitored by Gwynedd Archaeological Planning Service.

Gwynedd Archaeological Trust's proposals for fulfilling the requirements were, briefly, as follows:

a) *to identify and record the cultural heritage of the area to be affected;*
b) *to evaluate the importance of what was identified (both as a cultural landscape and as the individual items which make up that landscape); and*
c) *to recommend ways in which damage to the cultural heritage can be avoided or minimised.*

A full archaeological assessment usually comprises 6 phases:

1) *Desk-top study*
2) *Field Search*
3) *Interim Draft Report*
4) *Detailed Field Evaluation*
5) *Final Draft Report*
6) *Final Report*

This assessment has covered the work required under 1, 2, 3 and 4, and forms the final draft report.

3 METHODS AND TECHNIQUES

3.1 Desk-top Study

This involved consultation of maps, computer records, written records and reference works, which make up the Sites and Monuments Record (SMR), located at Gwynedd Archaeological Trust, Bangor. Aerial photographs were examined at the National Monuments Record, Aberystwyth, chiefly of 1940's date, and more recent photographs were examined at the Welsh Water Project Office. Estate maps, tithe maps and OS maps were examined at the County Record Office, Llangefni, and the University of Wales Bangor archives. Information about Listed Buildings and Scheduled Ancient Monuments was obtained from Cadw: Welsh Historic Monuments. Secondary sources were consulted to provide background information, particularly on the development of the port of Holyhead. A full list of sources consulted is given in section 7 of the report.

3.2 Field Search

The initial field search was undertaken on 29 August, 2002, when the route of the pipeline was walked by an archaeologist to note the present state of known sites, and to identify any archaeological features visible as earthworks. Additional visits were undertaken in October and November 2003.

Features identified were marked on copies of the 1:2500 OS map, as accurately as possible without surveying. Each feature was described and assessed. Detail notes, sketch plans and photographs were made of the more important features. These records are archived in Gwynedd Archaeological Trust under project number G1750.

3.3 Initial Report

All available information was collated, and the features were then assessed and allocated to the categories listed below. These are intended to give an idea of the importance of the feature and the level of response likely to be required; descriptions of the features and specific recommendations for further assessment or mitigatory measures, as appropriate, are given in the relevant sections of this report.

The criteria used for allocating features to categories of importance are based on those used by the Secretary of State when considering ancient monuments for scheduling; these are set out in the Welsh Office Circular 60/96.

3.3.1 Categories of importance

The following categories were used to define the importance of the archaeological resource.

Category A - Sites of National Importance.

This category includes Scheduled Ancient Monuments and Listed Buildings of grade II* and above, as well as those sites that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both.

Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

Category B - Sites of Regional Importance

This category includes grade II Listed Buildings and sites which would not fulfil the criteria for scheduling, but which are nevertheless of particular importance within the region. Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

Category C - Sites of District or Local Importance

These sites are not of sufficient importance to justify a recommendation for preservation if threatened, but nevertheless merit adequate recording in advance of damage or destruction.

Category D - Minor and Damaged Sites

These are sites, which are of minor importance, or are so badly damaged that too little remains to justify their inclusion in a higher category. For these sites rapid recording either in advance or during destruction, should be sufficient.

Category E - Sites needing further investigation

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A-D, are temporarily placed in this category, with specific recommendations for further evaluation. By the end of the assessment there should be no sites remaining in this category.

3.3.2 Definition of Impact

The direct impact of the proposed development on each site was estimated. The impact is defined as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:

None:
There is no construction impact on this particular site.

Slight:
This has generally been used where the impact is marginal and would not by the nature of the site cause irreversible damage to the remainder of the feature, *e.g.* part of a trackway or field bank.

Unlikely:
This category indicates sites that fall on the margins of the study area, but are unlikely to be directly affected.

Likely:
Sites towards the edges of the study area, which may not be directly built on, but which are likely to be damaged in some way by the construction activity.

Significant:
The partial removal of a site affecting its overall integrity. Sites falling into this category may be linear features such as roads or field boundaries where the removal of part of the feature could make overall interpretation problematic.

Considerable:
The total removal of a feature or its partial removal which would effectively destroy the remainder of the site.

Unknown:
This is used when the location of the site is unknown, but thought to be in the vicinity of the proposed development.

3.4 Field evaluation

Field evaluation is necessary to allow the reclassification of the category E sites, and to allow the evaluation of areas of land where there are no visible features, but for which there is potential for sites

to exist. Two principal techniques were used for carrying out the evaluation: geophysical survey and trial trenching.

Geophysical survey
This technique involves the use of a magnetometer, which detects variation in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetised iron oxides, which tend to be concentrated in the topsoil. Features cut into the subsoil and back-filled or silted with topsoil contain greater amounts of iron and can therefore be detected with the gradiometer. Strong readings can be produced by the presence of iron objects, and also hearths or kilns.

Other forms of geophysical survey are available, of which resistivity survey is the other most commonly used. However, for rapid coverage of large areas, the magnetometer is usually considered the most cost-effective method. It is also possible to scan a large area very rapidly by walking with the magnetometer, and marking the location of any high or low readings, but not actually logging the readings for processing.

Geophysical survey was undertaken at Capel Gorlas (site 4), and attempted at Ty Mawr (site 6), though conditions were found to be unsuitable.

Trial trenching
Buried archaeological deposits cannot always be detected from the surface, even with geophysics, and trial trenching allows a representative sample of the development area to be investigated. Trenches of an appropriate size can also be excavated to evaluate category E sites. These trenches typically measure between 20m and 30m long by 2m wide. The turf and topsoil is removed by mechanical excavator, and the resulting surface cleaned by hand and examined for features. Anything noted is further examined, so that the nature of any remains can be understood, and mitigation measures can be recommended.

Trial excavation was undertaken at Capel Gorlas (site 4).

3.5 Definition of Mitigatory Recommendations

None:

No impact so no requirement for mitigatory measures.

Detailed recording:

Requiring a photographic record, surveying and the production of a measure drawing prior to commencement of works.

Archaeological excavation may also be required depending on the particular feature and the extent and effect of the impact.

Basic recording:

Requiring a photographic record and full description prior to commencement of works.

Watching brief:

Requiring observation of particular identified features or areas during works in their vicinity. This may be supplemented by detailed or basic recording of exposed layers or structures.

Avoidance:

Features, which may be affected directly by the scheme, or during the construction, should be avoided. Occasionally a minor change to the proposed plan is recommended, but more usually it refers to the need for care to be taken during construction to avoid accidental damage to a feature. This is often best achieved by clearly marking features prior to the start of work.

Reinstatement:

The feature should be re-instated with archaeological advice and supervision.

4 ARCHAEOLOGICAL FINDINGS AND RECOMMENDATIONS

4.1 Topographic Description

Holy Island, or Ynys Gybi, is located off the western coast of Anglesey, to which it is joined by the Stanley Embankment, and also by the bridge at Four Mile Bridge (Pont Rhyd y Bont). Holyhead (Caer Gybi) is the principle town on Holy Island, and the proposed development site lies to the south-east of the town. The site is to the south and west of the aluminium works, and is bounded to the north by the railway and the new A55. To the south it borders the outskirts of the village of Trearddur Bay.

Geologically Anglesey is composed largely of Pre-Cambrian rocks, most notably the Mona Complex. These bedded rocks have undergone intense pressures leaving them deformed and folded, and volcanic events have resulted in their interbedding with lavas, ashes and tuffs. These make up much of the bedrock of Holy Island (Davies 1972).

The bedrock under the study area is composed of pale green chlorite schists, part of the New Harbour Group of the Mona Complex (Keeley 1987). Boulder clay overlies this, with the bedrock outcropping in places, and occasional patches of glacial gravels. The soils formed over these substrates are brown earths of the Rocky Gaerwen and Trisant types (Geological and soil survey maps). These soils can carry crops or excellent pasture, and were frequently chosen for settlement in the prehistoric period. The Rocky Gaerwen soils are shallow with frequent rock outcrops, and farms and fields tend to be smaller on these than on deeper soils (Keeley 1987).

A pollen study was carried out to the north-west of Trefignath burial chamber (Greig 1987). This suggested that the Boreal period vegetation was of a scrubby sub-arctic type. The woodland developed in the usual sequence, from open woodland with birch to denser, mixed oak forest, but with an unusual amount of willow. The climax forest contained oak and elm with hazel as an under-storey. A band of peat, with little pollen survival due to the drying out of the bog, was dated to about the start of the Neolithic period. The band contained charcoal and other evidence for burning, suggesting forest clearance in the immediate area. When the pollen record continued it showed that the forest had been replaced by grassland and arable fields. In the medieval period, and later, expanding arable farming caused increased erosion into the bog.

4.2 Archaeological and Historical Background
(see figure 1)

The study area must be seen in relation to the port of Holyhead, and the rich archaeological heritage of Holy Island. The location of Holy Island within the busy western seaways linking Brittany, Cornwall, Ireland, Wales, Northern England, Scotland and the Viking countries to the east provides an international setting until post-medieval times, when its use as an official port for Ireland became of dominant importance. The port of Holyhead provided easy access in most weather, and recognition from sea was aided by the dominant mass of Mynydd y Twr, or Holyhead Mountain.

Evidence for activity from Neolithic times (*circa* 4000 BC to 2500 BC) to the present is abundant within the northern part of Holy Island. The two Neolithic tombs of Trefignath and Trearddur lie close to the study area. Four Neolithic polished stone axes have been found in the northern part of Holy Island (Lynch 1991), including two Graiglwyd axes found when excavating a hole for a turntable railway near Kingsland in 1926 (PRN 2507, SH 2504 8165), and one axe of unspecified stone found at Penllech Nest (PRN 2506, SH 251 816).

Two Bronze Age barrows were prominently situated on top of Holyhead Mountain (SH 219 829), though little can be seen of them now, and three barrows lay close to the shore at Porth Dafarch (SH 234 801), whilst others were situated at Garn (SH 211 825) and Gorsedd Gwlwm (SH 227 816). A barrow was recently discovered under the early Christian cemetery at Ty Mawr (SH 2520 8135). The

Ty Mawr standing stone is one of several such stones in this part of Holy Island. There is another to the south, next to Stanley Mill (SH 2664 7888), and a rare pairing of two stones just over 3m apart, to the west at Plas Meilw (SH 227 809) (Lynch 1991).

The island has several notable Iron Age and Roman period sites. Holyhead is dominated by its mountain, to the north-west of the town. The summit is enclosed by a stone rampart wall forming the hillfort of Caer y Twr (SH 219 829). A much smaller promontory fort, Dinas on the south coast of Holy Island (SH 223 794), is probably also Iron Age. This promontory is surrounded by high cliffs and a low bank runs along the edge of the chasm, which separates it from the mainland. These forts were probably defensive refuges, and the population lived in more hospitable areas. Towards the foot of the south-western slope of Holyhead Mountain are a group of huts near another Ty Mawr (SH 211 820) and a similar hut group overlie the Bronze Age barrows at Porth Dafarch (SH 234 801). Excavation at Ty Mawr demonstrated that the stone huts belonged to the 1st millennium bc, but with some activity in the 3rd century AD, as well as earlier prehistoric and post-Roman settlement evidence. The finds from Porth Dafarch dated the huts to the Roman period (Lynch 1991, RCAHMW 1937).

A Roman fort was constructed at Holyhead towards the end of the 3rd century or later, as a naval base against Irish raiders. A Roman coin hoard was found in the area in 1710. The coins were buried in a brass vessel, and all dated to the 4th century (PRN 2503, SH 26 81).

Holy Island was of considerable importance in the early Christian period, with the *clas* site of Caer Gybi large enough to attract the attention of the Vikings in 961 (Edwards 1986,24). The foundation of this monastic community by St Cybi is traditionally dated to the mid 6th century AD. There is an unusual concentration of early Christian sites known, or suspected, on the island. These include a cemetery of long-cist graves, dating to approximately 6th to 8th century AD, discovered during the construction of the A55 dual carriageway, to the north-west of Ty Mawr Farm. At this site the graves were located around, and cut into, the remains of a Bronze Age barrow. Another cemetery, of similar date, lies to the south-west of the study area, at Tywyn y Capel, the site of a medieval chapel on the shore of Trearddur Bay (Edwards 1986, 31). There were early Christian cist burials found at Porth Dafarch.

The development of the parochial system in the 12th century saw Holyhead church change from a *clas*, or 'mother' church to a collegiate one. Responsibility remained, however, for a number of small chapels in the area, usually with associated wells, including Capel Ulo, and Capel Gorlas.

The official use of Holyhead as a port increased in the reign of Elizabeth I, when it became the departure point for the Royal Mail to Ireland. During Oliver Cromwell's Commonwealth Holyhead was garrisoned, and regular packet boats sailed to Ireland (Hughes and Williams 1981). The port subsequently grew until, by the early 19th century, it was the principle port for Ireland.

During the 17th century the road across Anglesey to Holyhead was probably just a rough track, but the forerunner to the present bridge at Four Mile Bridge already joined Holy Island to Anglesey by 1578 (Hughes and Williams 1981). One of the earliest maps of Anglesey, published by Speed in 1630, marks Pont-Rhydbont (the bridge at Four Mile Bridge), and just to the west of it is Llansanfraid (St Bride's or Trearddur Bay), the only place marked on Holy Island, other than Holyhead itself (Evans 1972).

In 1765 the road from the Menai ferries to Holyhead was turnpiked, and much improved (Ramage 1987). However, transport was still difficult until Telford built his new London to Holyhead road (the A5), which was opened in 1823 (the suspension bridge across the Menai Strait was opened in 1825). The Stanley Embankment (grade II listed, 20074) carried the road over Afon Lasinwen, the tidal strait between Holy Island and Anglesey, supplementing the bridge to south, and replacing a number of fords (GAT 251). The embankment was designed by Thomas Telford, started in 1822 and opened in 1823; its construction created the body of water now referred to as the Inland Sea. In 1846-8 the railway line was constructed along the southern side of the embankment (GAT 204, 251). Major improvements were also made to the harbour throughout the 19th century, first by Rennie and Telford who improved the inner harbour, and later the outer harbour was created by constructing a new breakwater (Hughes and Williams 1981). This was a massive undertaking, designed by J M Rendal and completed by J Hawkshaw, it used some 7 million tones of stone and took nearly 30 years to construct, during which time the population of Holyhead rose from just over 2000 to nearly 9000.

The coming of Telford's road and the railway significantly changed the landscape of Holy Island, and this was, in part, accompanied by a change in field layout, when many small holdings and smaller fields were removed and new rectangular field systems laid out. Some common land was enclosed by Private Act (Carr 1982), such as the small areas of common land around Ty Mawr enclosed in 1861 (WPE 68/128).

Most of the land in the study area was owned by the Penrhos estate. The owners took the surname Owen in the early 16th century (Richards 1940), but in 1763 Margaret Owen, the heiress to Hugh Owen, married John Stanley and the estate passed to the Stanley family of Alderley (Ramage 1972, 1987, Richards 1940). W O Stanley was a noted antiquarian, and the Penrhos estate maps provide valuable historical evidence.

The majority of the area through which the pipeline passes consists of a number of farmsteads surrounded by regularly shaped fields. Some of the farmsteads are now abandoned and ruinous. The farm layout was generally established by 1769 (the date of the first estate survey), but numerous fields have been amalgamated at various periods since then, and some boundaries have been lost or altered. Unlike the area to the north of Holyhead (Penrhos estate map II, 772, map 14), there are few remnants of strip fields surviving in the late 18th century, though a number of smallholdings had been established, surrounded by small irregular fields, many of which have now disappeared.

4.3 The Existing Archaeological Record
(See figure 2)

Eleven features were identified within the survey area, of which seven will be directly affected by the pipeline. These are listed below along with recommendations for further assessment and mitigatory measures.

1. Breakwater tramway SH23208346
Category: B Impact: Slight
In 1847 parliamentary approval was grant ed for the construction of a breakwater to extend the size of the harbour at Holyhead. Initially intended to be 5360 feet long, it was later extended by a further 2,500 feet. Though the facing stones for the breakwater were limestone and were shipped in from Moelfre on the east side of Anglesey, the bulk of the stone came directly from the mountain adjoining the breakwater, and was transported in special wagons on a broad gauge (7 foot) gauge. Following completion of the breakwater the tramway was used both for maintenance and by a brickworks sited in the quarry to make use of the silica stone exposed during quarrying operations. In 1910 a contract was awarded to S Pearson and Son for repairs to the breakwater, and they laid a new standard gauge line alongside the old broad gauge, the latter falling out of use by 1913. In 1934 the standard gauge line was relaid with new rail. The line finally closed in 1979-80. Both tracks have been lifted, and the line is preserved as a road to the Breakwater quarry, now a country park. A length of the 7' gauge rail is preserved in the park (see Neale 1997 for a history of the line and rolling stock).
Recommendations for further assessment: *None*
Recommendations for mitigatory measures: *It is important to minimise the impact upon the tramroad during construction, to* ***re-instate*** *the boundaries after construction, and to undertake* ***detailed recording*** *of the section across the tram road to record its make up and details of construction.*

2. Footpath, Cae Fabli SH23208306
Category: D Impact: Slight
A footpath running from Cae Fabli into open fields it is one of several footpaths which originally converged onto the water mill at Felin Ddwr (also called Tref Engan mill) to the east. It is shown on the 1840 tithe map as the principal route running past Cae Mably and on to another smallholding (Ty Mawr) to the north, the link with Felin Ddwr does not appear to have been established by this time, so must be mid or late 19th century.
Recommendations for further assessment: *None*
Recommendations for mitigatory measures: ***Watching Brief*** *during construction and* ***basic recording*** *of a section through the line of the path.*

3. Track and building at Tan y Bryn SH23178286

Category: D Impact: Slight
The pipeline runs along the track past Tan y Bryn. This narrow track is clearly marked on the tithe map, when it formed the principal route to Tan y Bryn, Cae Mably and Ty Mawr, and is the south part of the footpath described in site 2.
Recommendations for further assessment: *None*
Recommendations for mitigatory measures: Minimise impact and re-instate following construction.
Watching Brief *during construction and* ***basic recording****.*

4. Capel Gorlas (PRN 1761) SH23388243
Category: B Impact: Unknown/Likely (see figure 4)
Capel Gorlas is one of several medieval chapels, often with an associated well, which lay on Holy Island. The exact location of Capel Gorlas is unknown, though the name is remembered in the house and buildings called Ffynon Gorlas. A well, surrounded by a stone wall and reached by a track from the present house, lies in the field south-west of the house. This is probably the site of the medieval Ffynon Gorlas, though the surrounding masonry does not look much earlier than the 19th century. A description of 1775 describes it as 'Capal y Gorlas, in the east end of which was a famous spring called Ffynon y Gorlas' (Anon, 1775, 35). This would place the chapel west of the well, and further from the farm house and associated buildings. It is not clear if the well lay within the chapel, an unlikely event, or outside it. There is no indication of a structure to the west of the present well. Mr Thomas of Cerrig y Lloi, the adjoining farm, says his father always spoke of the chapel as lying in the west corner of the well field. There is no visible evidence of former structures at this point, though slight undulations alongside and in the center of the west wall of the field may indicate a former structure. Another possible location is on the site of the farm buildings alongside the house. Neither chapel nor well are marked on an estate map of 1805, which shows a single building only on the site of the present farm buildings (see fig xx). The route of the pipeline crosses between the well and the house, and in between two later farm buildings. These are not marked on the 1890 edition of the Ordnance Survey map, though they are clearly marked on the 1:10560 1926 edition, so were presumably built in the early years of the 20th century.

Because of the known presence of a medieval chapel in the vicinity, geophysical survey and trial excavations were undertaken along the route of the proposed pipeline, as recommended in Report 462.

PRN 74531

The geophysical survey (see Appendix I) did not reveal any archaeological evidence, as the magnetism of the underlying rocks was too high to allow archaeological features to be recognised. Trial excavation, however, revealed a rectangular pit dug into the natural clay, and partly lined with stone slabs. The pit was full of broken stone showing signs of burning, and the same material lay around the pit on top of the natural clay. This has been provisionally interpreted as a burnt mound of Bronze Age date, with no apparent relationship to the medieval chapel. The burnt stone has been excavated to natural clay, and the pit has been excavated and recorded (see Appendix I).
Recommendations for further assessment: *None.*
Recommendations for mitigatory measures: ***Avoidance*** *of the pit. This should be possible by ensuring the pipeline passes between the two buildings on the east side of the gap. It would be best if the fencing for the route corridor were put in under archaeological supervision. A continuous* ***Watching Brief*** *during initial top-soil stripping, with time allowed to clean areas by hand and record any features exposed.* ***Basic recording*** *of the two farm buildings. The associated well is overgrown, and though there will be no direct impact during construction, clearance, recording and consolidation of the surrounding walls would allow a better understanding of the site and its nature, and help ensure survival of the structure.*

5. Track, Mynydd Evan SH23508229 PRN 74527
Category: D Impact: Slight
A track serving the farm of Mynydd Evan. It is not shown on the tithe map of 1841, but is clearly marked on the OS 25" map of 1890.
Recommendations for further assessment: *None*
Recommendations for mitigatory measures: ***Watching Brief*** *during construction and* ***basic recording*** *of a section through the line of the track..*

6. Romano-British settlement, Ty Mawr PRN 14602 SH25548097
Category: B Impact: Considerable (See figure 5)
Remains of a late prehistoric or Romano-British settlement were found at this location during trial evaluation carried out in 2001. The features found included stone-capped drains, burnt stone and

fragmentary stone walls. The full extent of the settlement was not recovered. Magnetometer survey of this area was attempted, but did not prove feasible because of restrictions caused by a buried pipeline, and by the previous use of the field as a top soil store (see Appendix I).
Recommendations for further assessment: *If avoidance is not possible, it will be necessary to establish the extent of the settlement by* ***Trial Excavation****.*
Recommendations for mitigatory measures: Avoidance*.*

7. Railway line
Category: B Impact: Slight
The pipeline has to cross the Chester to Holyhead Line, designed by Robert Stephenson and built by the contractors E L Betts, it was opened in March 1848. Many of the original walls, culverts and fittings remain.
Recommendations for further assessment: *None.*
Recommendations for mitigatory measures: *Preservation in situ. If there is to be any impact then* ***Basic Recording*** *and* ***Reinstatement*** *of affected features is to be undertaken.*

4.4 Sites lying close to the route

The sites described in this section lie close to the proposed route of the pipeline, but will not suffer direct impact if the present line is followed. Care must be taken when obtaining access to the pipeline route that these sites are not disturbed.

8. Two footbridges over the tramway NGR SH23358352 and SH23068340
Category B: Impact: None
The two footbridges over the quarry tramway lie either side the route of the pipeline, and were constructed to provide access to the fields by farms on the south side of the tramway.

9. Burial chamber near Gorlas PRN 1750 NGR SH23408250
Category E: Impact: Unknown
An antiquarian account describes the presence of a possible Neolithic burial chamber near to the site of Capel Gorlas. The attribution is doubtful, but possible. The exact site is not known.

10. Spring, Cae Allt Wen NGR SH23578215
Category D: Impact: None
The remains of a wall around a spring lie just west of the pipeline route. It served the farm of Cae Allt Wen. It is not marked on the 1890 OS map, so is likely to be of later date.

11. Ty Mawr Standing stone PRN 2501 NGR SH25388096
Category: A (Scheduled Ancient Monument) Impact: None
A standing stone of Bronze Age date.

Entire Route

Many sites of archaeological importance are not recognisable by assessment techniques alone, and only become apparent during field evaluation (geophysical survey and trial excavation) or during a watching brief. Whilst field evaluation has been undertaken on two specific areas of the route (sites 4 and 6), the remainder of the route would be adequately examined by a watching brief during the top soil strip and, if required, during trench excavation. This would ensure all sites not identified by the assessment process but affected by construction will be identified and recorded.

4.5 Summary of importance and impact

Feature no	Category	Impact	Mitigation measures
1	B	Slight	Watching brief and Basic Recording
2	D	Slight	Watching Brief and Basic Recording
3	D	Slight	Reinstate, Watching Brief and Basic Recording
4	B	Unknown	Avoidance and Comprehensive Watching Brief
5	D	Slight	Watching Brief and Basic Recording
6	B/E	Considerable	Avoidance
7	B	Slight/None	Avoid/Basic Recording and Reinstatement
Entire route	E	Considerable	Watching Brief

5. SOURCES

OS Maps
OS 1:10,000 map sheets SH 70 SW (1980) and SH 70 SE (1979)
25" County Series Anglesey V.14 and XI.2 surveyed 1887
6" County Series Anglesey Sheets V SW, V SE, XI NW and XI NE surveyed 1887 revised 1923

Aerial Photographs
National Archaeological Record, Aberystwyth
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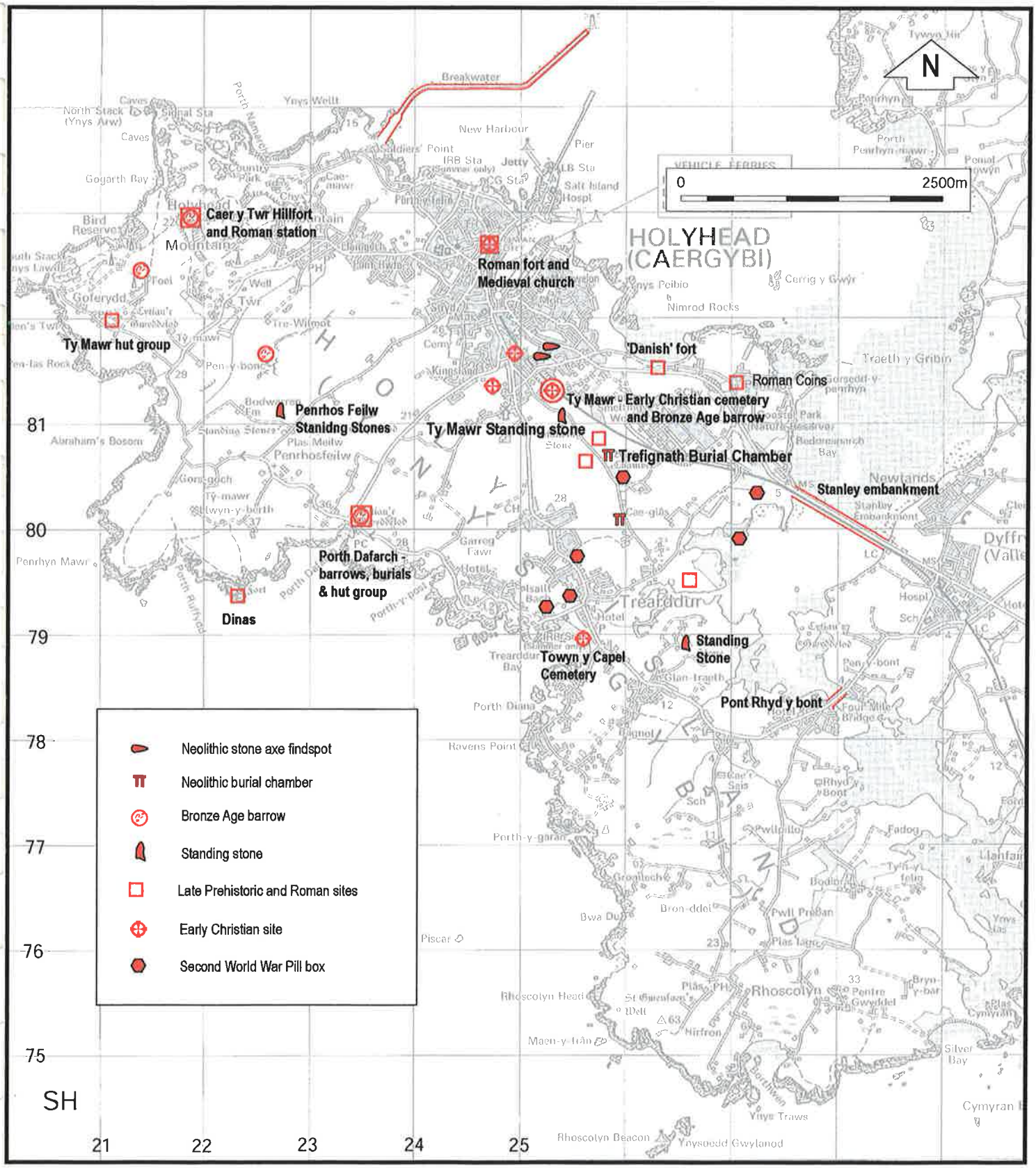

Fig 1. Location of sites in proximity to study area.

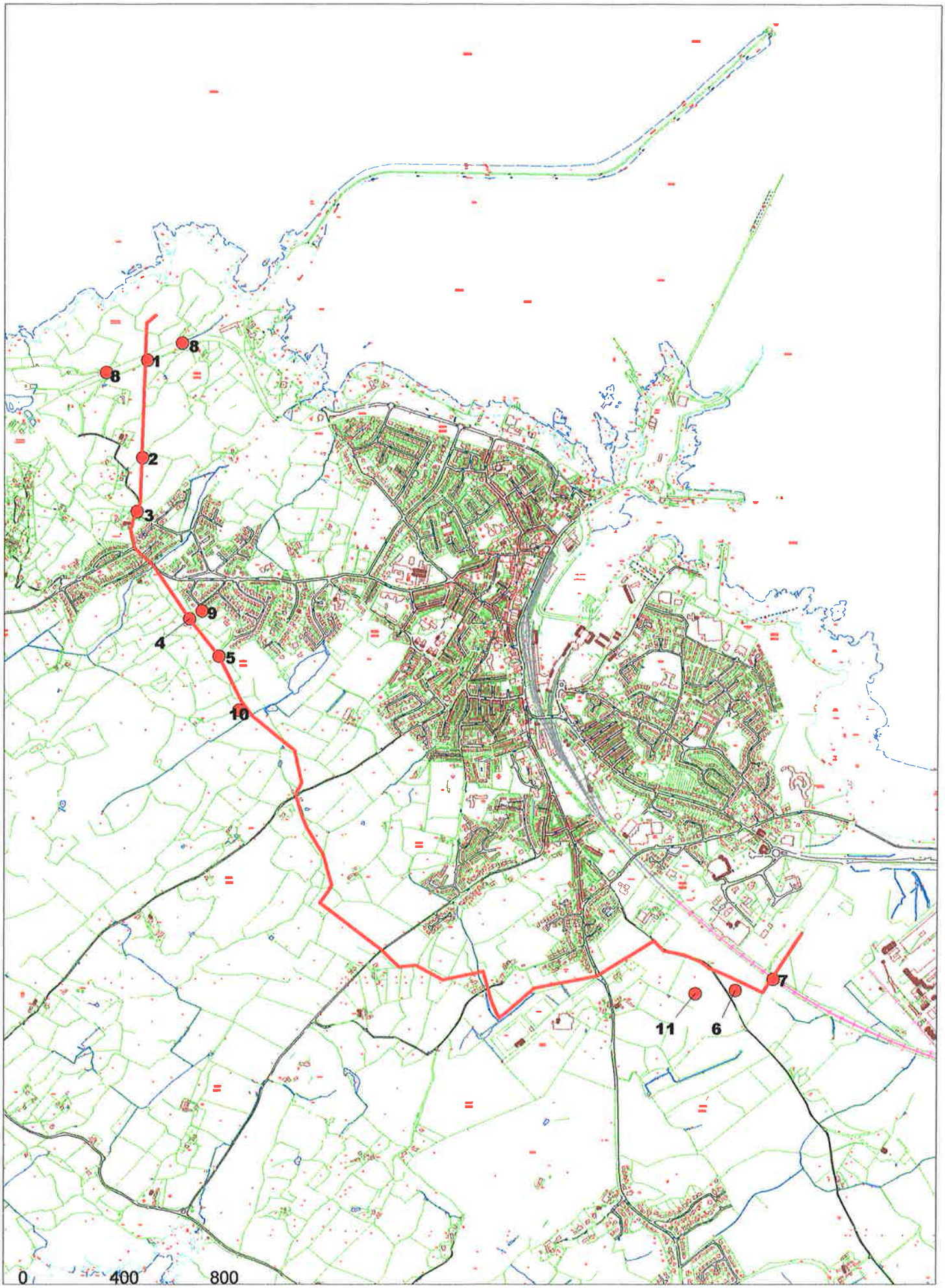

Fig 2. Location of archaeological sites

Fig 3. Tithe map of 1845 with approximate route of pipeline

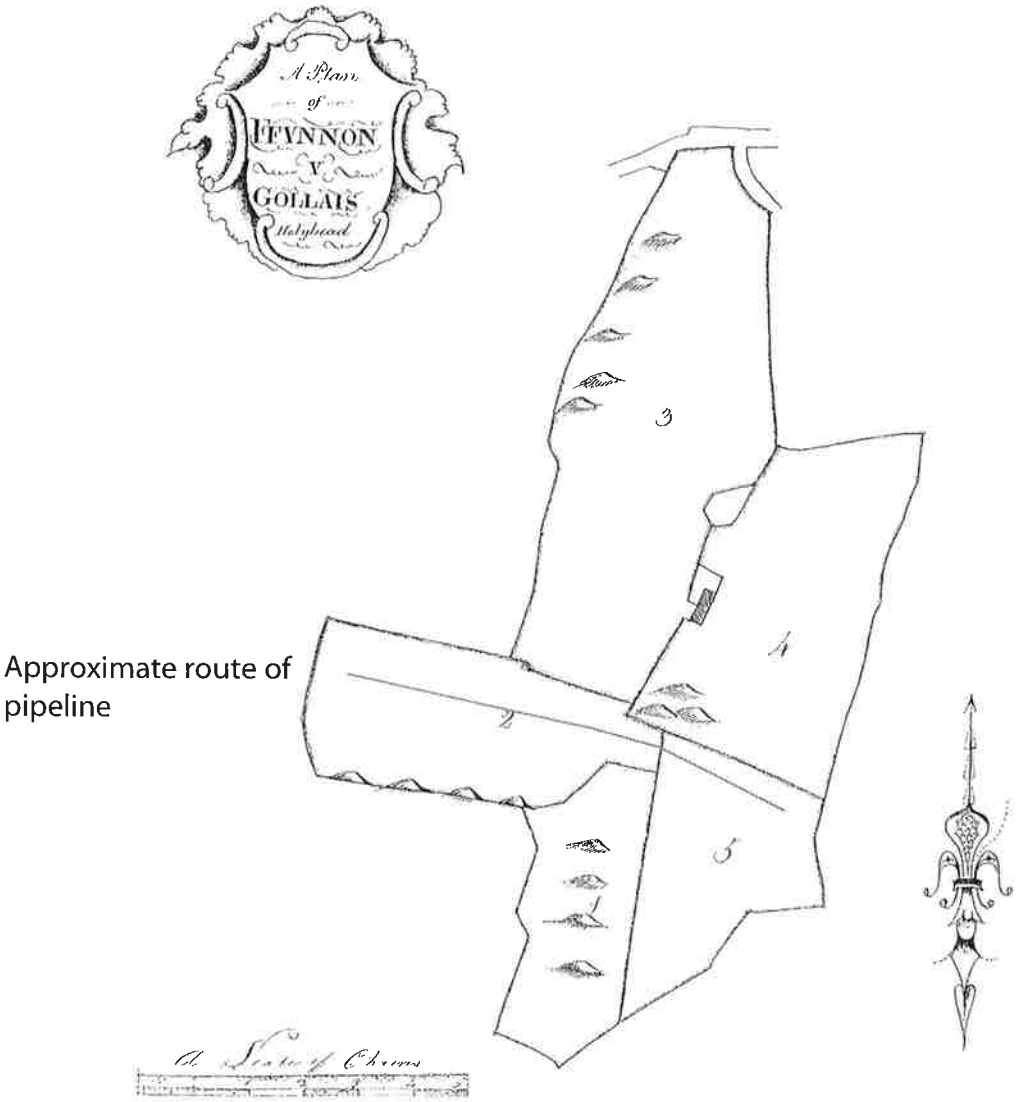

Fig 4. 1805 map of Ffynon Gorlles (Penrhos III 208). Note that neither the well nor chapel are marked, and no field names are given in the schedule.

APPENDIX I: FIELD EVALUATION

1 GEOPHYSICAL SURVEY REPORT

1.1 Introduction

The basic requirement was for fluxgate gradiometer survey of two areas on or close to the pipeline route.

Area A (Site 6) (see fig 5)
Area A was in fields that had been partly surveyed during assessment of land at Ty Mawr, Holyhead (GAT report 429, 2002). It was known that there had been a topsoil storage area in this location during the A55 construction works (Fig. 8). A 20m x 80m area was surveyed which produced very noisy results although some faint linear anomalies were visible. Trial excavation was carried out and it was revealed that about 0.6m of dumped topsoil had been left *in situ* and that the deposits beneath this were undisturbed. A series of walls and drains were identified during the excavations, under the eastern end of the topsoil dump. These features predated any map evidence for the area and were therefore interpreted as being pre-eighteenth century. No conclusive dating evidence was recovered although one sherd of abraded Roman pottery was found. It was however, noted that this could have been residual. The features identified in the trial excavation bore no relation to the faint anomalies from the geophysical survey. The dumped topsoil was 0.6m deep and was magnetically noisy. This resulted in masking of archaeological features. Elements of the features were also about 1.0m below the surface, this being the point where the sensitivity of the gradiometer begins to fall off steeply with depth. These factors rendered gradiometer and probably also resistivity survey redundant in the topsoil dump area. Assessment during the present project therefore avoided the topsoil storage area. The route of the proposed pipeline runs through the eastern part of the storage area but associated archaeological features could extend beyond this.

Area B (Site 4) (see fig 6)
Area B was in the field to the north of the two derelict farm buildings that stand to the west of Ffynon Gorlas house and buildings (Fig. 9). A former ecclesiastical site, Capel Gorlas, is thought to have stood somewhere close to a well in this area although its exact location is lost. The route of the proposed pipeline runs between the derelict buildings and through the centre of the survey area.

1.2 Methodology

Gradiometer survey has the advantage of being non-invasive and relatively swift. It is ideal for detecting larger scale features such as relict field boundaries and enclosure ditches. Smaller features such as graves are less commonly detected because of the relatively course resolution (0.5 x 1.0m) of area survey. Associated features such as enclosures and denuded barrows can be detected and thus provide valuable supporting evidence.

a. Instrumentation

Geoscan FM36 Fluxgate Gradiometer.
This instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetised iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent magnetic field upon cooling. Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil, and in some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features.

The Geoscan FM36 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 500mm apart. Their Mumetal cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output (Clark 1990).

The gradiometer can detect anomalies down to a depth of approximately one metre. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT, typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT.

b. Scanning and Data Collection

The area is usually first examined using a fast assessment technique called magnetic scanning. The operator walks across the field in widely spaced traverses. No readings are recorded but the visual display is observed. This procedure allows large ferric (e.g. pipelines) and bedrock anomalies to be avoided in the main survey and under certain conditions allows areas that appear to be archaeologically promising to be targeted.

The gradiometer includes an on-board data-logger. Readings in the surveys were taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval was one metre. Readings were logged at intervals of 0.5m along each traverse giving 800 readings per grid.

c. Data presentation

The data is transferred from the data-logger to a computer where it is compiled and processed using Geoplot software. The following display option is used in this report along with an interpretation drawing, if appropriate.

Grey-Scale plot

Data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. A smoothed version of the above may also be included. This does not contain any additional information; its function is to suppress the random background noise allowing anomalies to be seen more clearly.

d. Data Processing

The data is presented with a minimum of processing. High readings caused by stray pieces of iron, fences, etc are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. Corrections are also made to compensate for instrument drift and other data collection inconsistencies. Any further processing is noted in relation to the individual plot.

1.3 Results

Survey Area A (site 6)

Magnetic scanning revealed the presence of a major pipeline, (probably the Shell gas line) running parallel to the A55. This produced a major ferric anomaly with readings into several hundred nT, effectively masking any archaeological anomalies (typically 5 to 15nT) in a 20m band across the northern part of the fields. A large mound in the southern half of the field produced large fluctuating anomalies indicating that magnetic igneous bedrock was close to the surface. This would again mask any archaeological features. Previous survey demonstrated that a former topsoil storage area was unsuitable for survey. These areas are shown on Fig. 5 and it can be seen that there are only small areas where gradiometer survey could be carried out. Previous work during the Ty Mawr assessment demonstrated that results in this area are generally noisy and reasonably large areas (at least 80m x 80m) need to be surveyed in order to obtain meaningful results. This was clearly not possible here and no further work was undertaken.

Survey Area B (site 4)

Magnetic scanning revealed strong bedrock anomalies in the southern corner of the survey area with lower responses at the north. A roughly rectangular area with dimensions of 60m x 40m was surveyed.

Survey Conditions

Survey conditions were good with stable temperatures and short grass in a level field.

Area B survey results (Fig. 6)

The survey plot has been clipped to +- 25nT; readings in the southern part of the survey area peaked at over 200nT, thus masking any archaeological anomalies. The curvilinear anomaly in the central northern part of the survey area also appeared to be a result of geology. No other anomalies were visible.

1.4 Conclusions

The geophysical survey failed to reveal any anomalies that could be interpreted as archaeology. Area A contained three large areas that were unsuitable for survey and no further work was carried out. About half of area B was masked by responses from geology and no anomalies were visible in the remaining portion of the survey.

1.5 Bibliography

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2 TRIAL EXCAVATION

2.1 Indtroduction

Trial excavation was undertaken at Site 4 because of the potential for recovering the remains of a medieval chapel. It is proposed that the pipeline will pass between two farm buildings of early 20th century date, lying some 9.25m apart. These lie on top of a low ridge orientated WNW-ESE (c. 30m OD), with ground falling to north and south – the former pasture fields, and the latter a reed bed. A well, reputedly connected with the site of the medieval chapel, lies 30m to the south-west of the excavation area.

2.2 Methodology and results

An area 9m x 6m (see fig 7 and 8) was cleaned by mechanical excavator using a 1.5m wide toothless bucket. This revealed a layer of hard standing, consisting of small broken stone typically less than 100mm in size. Many of the stones were red in colour, as though burnt. They lay in a matrix of black silt, with medium to fine particles, some of it almost clay. No charcoal was immediately apparent, though again the material appeared burnt.

The stone layer was removed by machine, which revealed an underlying natural white clay, which formed the top of the ridge. Into the clay, on the south-west side, had been dug a pit approximately 2m long by 1.2m wide, orientated east-west (see fig 8 and 9). This was full of the same fragmented stone and dark silt. Two upright slabs defined the north-east corner, and a natural boulder lay along the remainder of the east side. Another slab lay at the west end, but the remainder of the sides were of clay. The base of the pit sloped from east to west.

Outside the pit, off the south-west corner, was found an aperture to a narrow hole leading at an angle of approximately 45 degrees into the ground. It appeared to have been purposefully dug, and had a stone lintel supporting the roof. The aperture measured approximately 350mm across, and 80mm deep. It was separated from the adjacent pit by a bank of clay.

2.3 Interpretation

The fragmented stone and dark silt are very similar in appearance to those that occur on sites typically called burnt mounds. These vary in detail, but consist of mound of burnt and fractured stone which makes up ver 90% of their content , the remaining material being dark clay/silt with charcoal intrusions. A rectangular pit lies adjacent to or under the burnt stone. Although the function of burnt mounds remains unknown, there is little doubt that the remains consist of stone that was heated in a fire, and then used to heat water within the adjacent pit. This could then have been used for cooking, washing, or textile processing. The mound of stone is formed by the disused stone, which can only be used a limited number of times before the fracturing and splitting caused by the sudden change in temperature reduces its effectiveness to conduct heat. The mounds are always adjacent to a water supply, usually a stream or spring. Evidence from other sites shows that burnt mounds were used drom the Early Bronze Age to historic times, though the principal period of use was in the later Bronze Age c. 1200 to 800 BC.

Though this site is similar to other excavated examples of burnt mounds, difficulties of interpretation remain. The lack of charcoal in the black silts may be due to their loss through chemical and water action, or it may be that the dark silts are the result of manganese staining. Samples have been taken, and will be subjected to further analysis and, if charcoal can be retrieved, radiocarbon dating.

The drain is also difficult to interpret. It may be directly associated with the pit though no parallels are known to exist with other burnt mounds. Alternatively, the farmer says a major land drain, dug in the late 19th or early 20th century, runs across the ridge and north through the fields. It may be that the excavated feature links into the field drain, and was dug in the early 20th century to drain the area alongside the sheds, where cattle were kept. However, the aperture was full of the fragmented stone and black silt, and was overlain by it, thus arguing for a date contemporary with the pit.

2.4 Recommendations

The sampled material requires analysis of both the stone and silts. If it is possible to obtain charcoal this should be sent for radiocarbon dating.

The pit should be avoided during construction of the pipeline, and a watching brief maintained during construction.

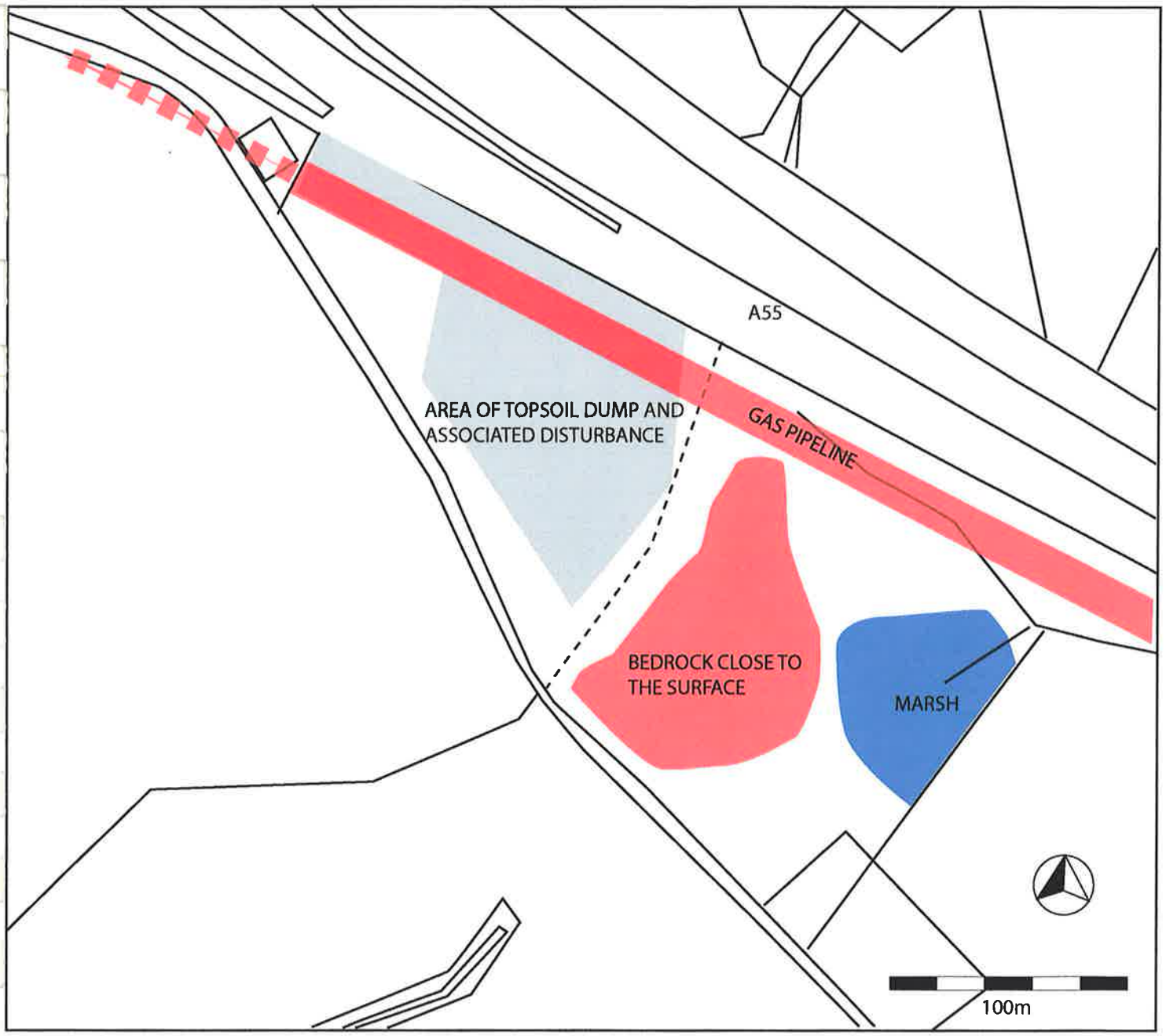

Fig. 5 Geophysical survey area A, results of magnetic scanning

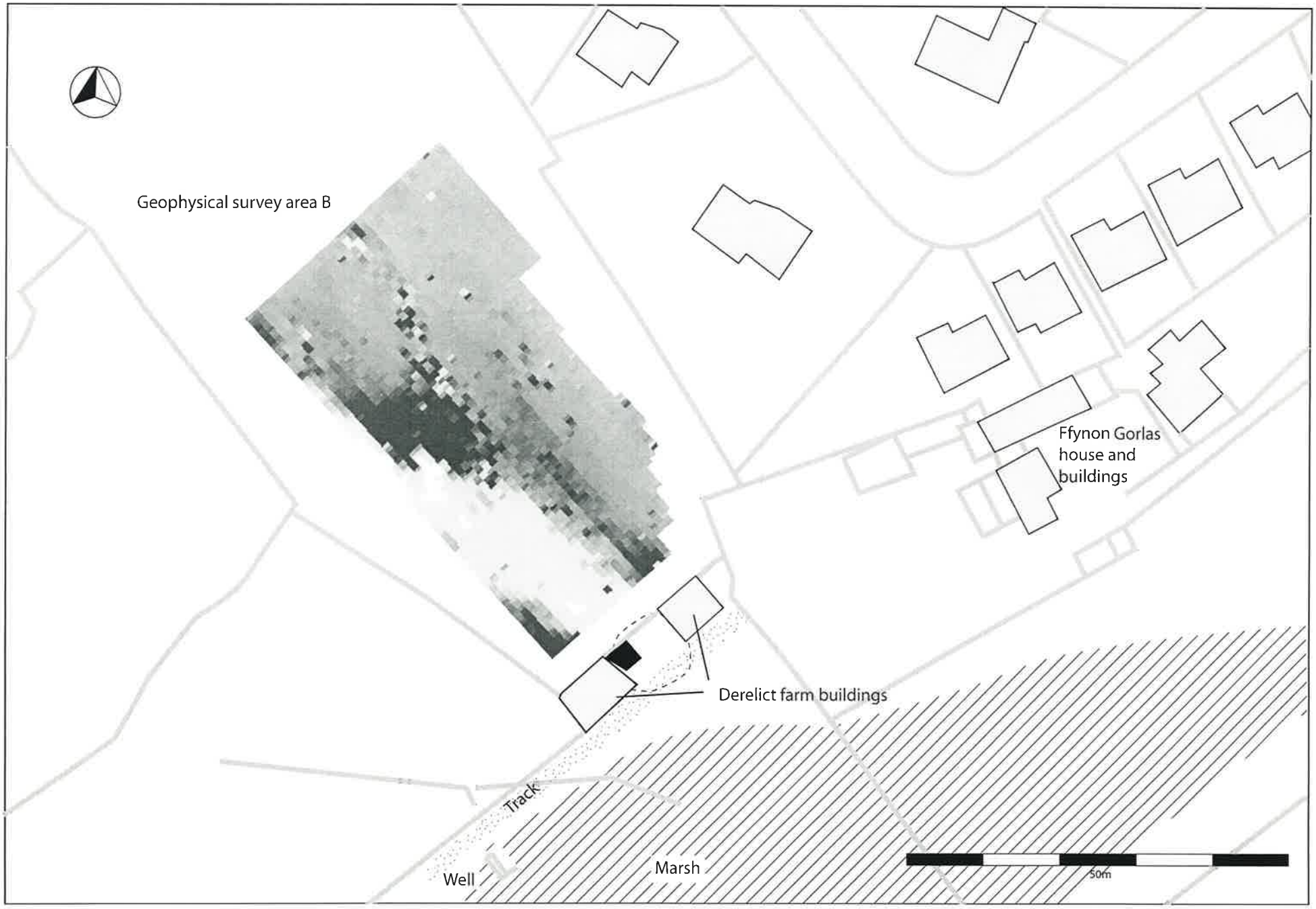

Fig. 6 Geophysical survey area B, grey-scale plot

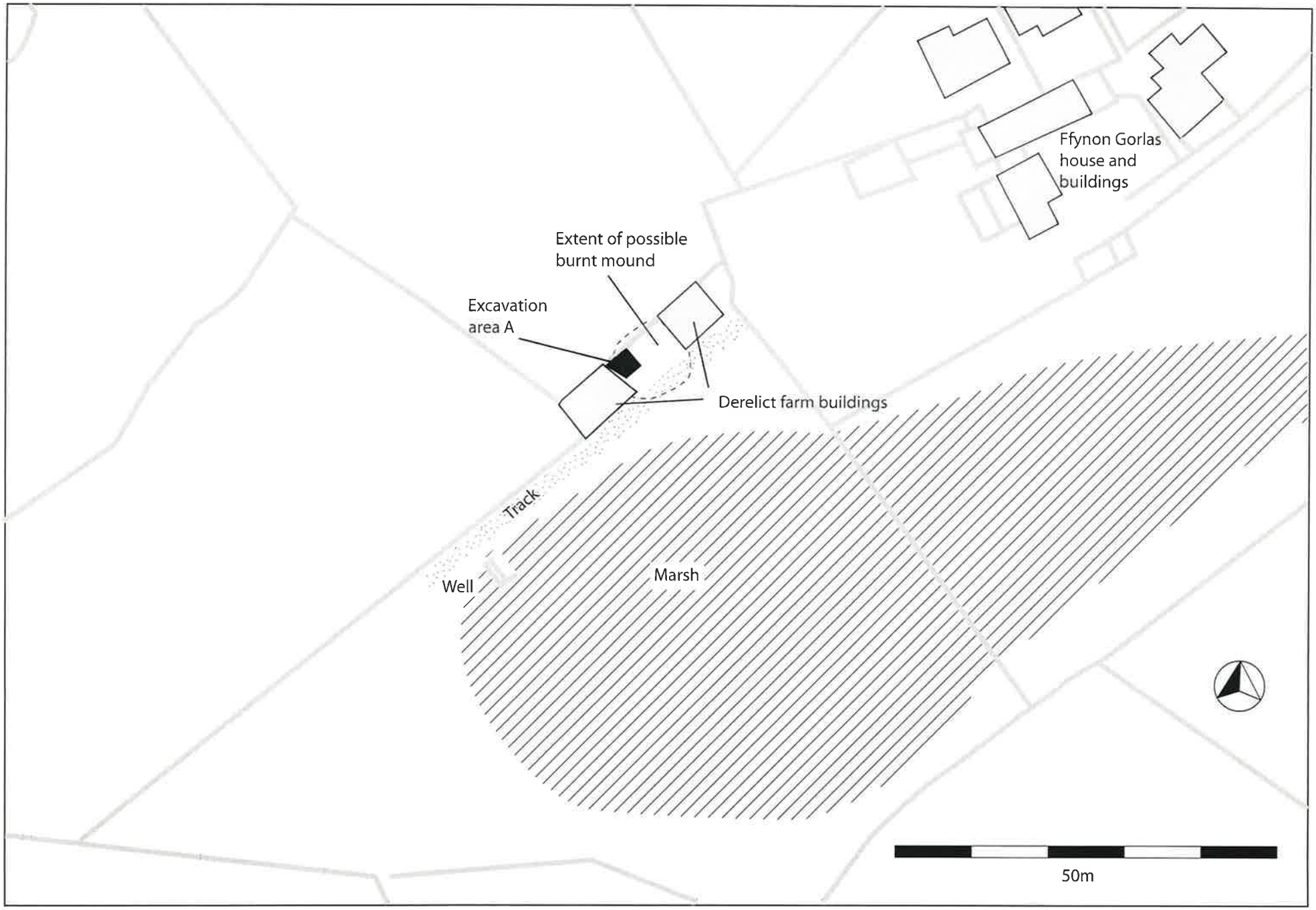

Fig. 7 Location of excavation and associated features

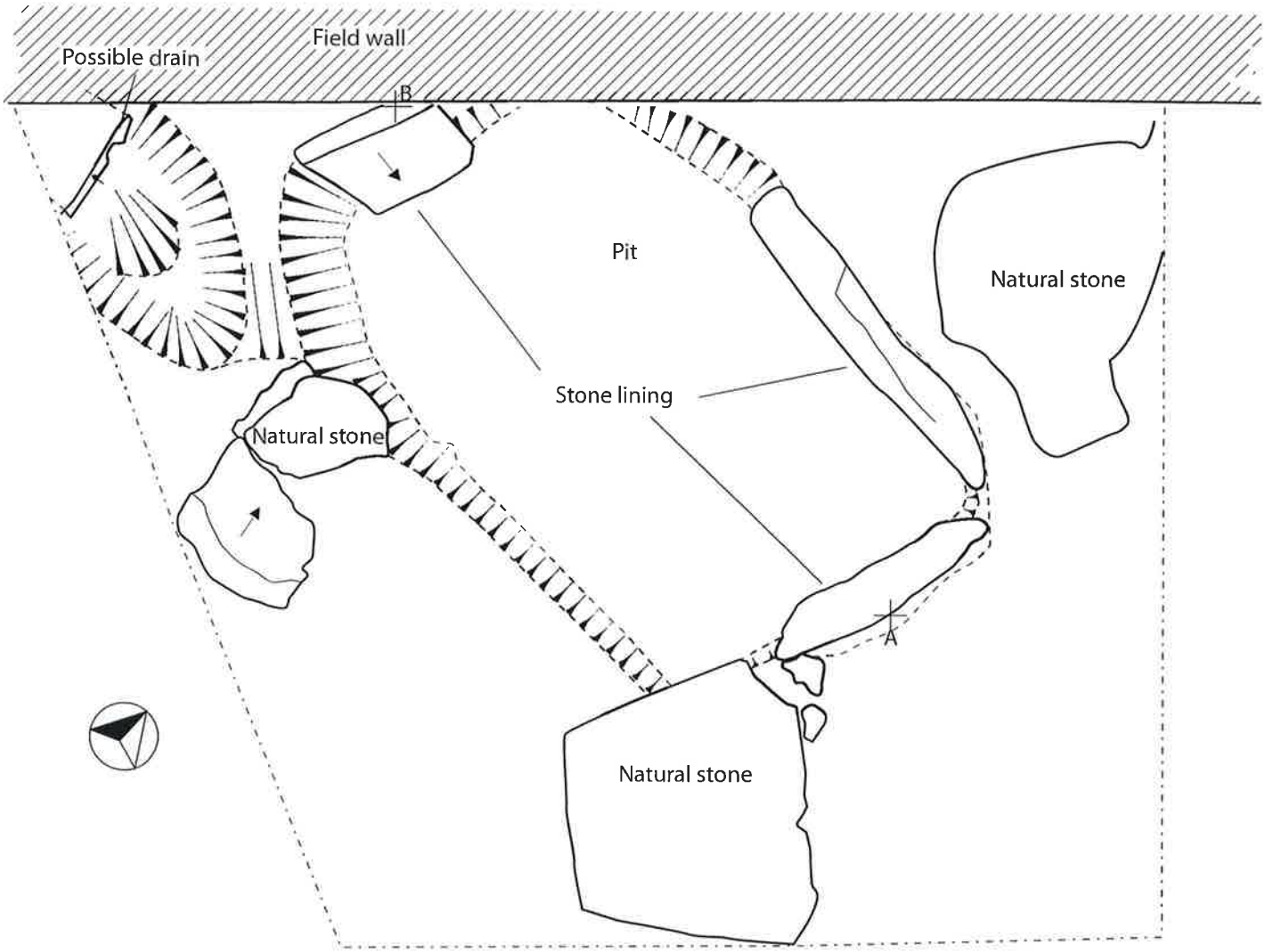

Fig. 8 Excavation area A: Plan of pit

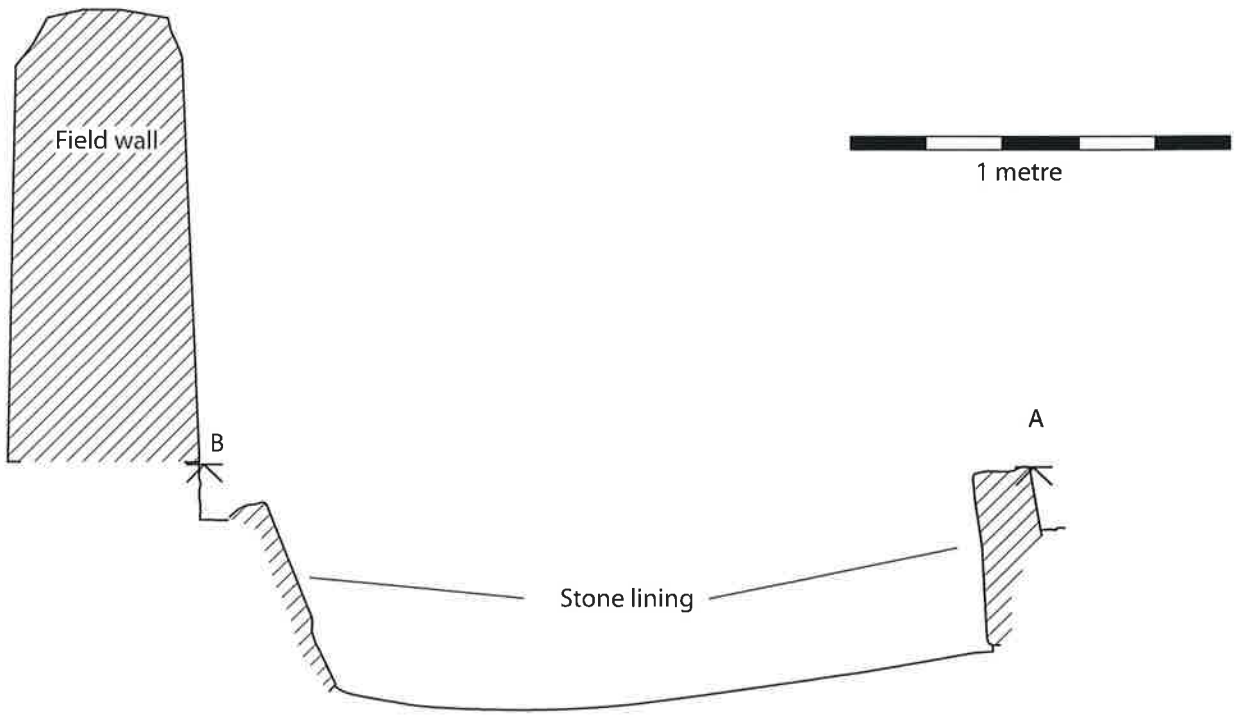

Fig. 9 Profile across pit

Fig 10a: Fragmented stone after initial cleaning

Fig 10b: Stone-lined pit after excavation

Fig 10c: Drain (?) at west corner of pit