
Rhiwgoch Raw Water Main Replacement Works Near Harlech



Assessment Report

GAT Project No. 2055
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**RHIWGOCH RAW WATER MAIN REPLACEMENT WORKS
AN ARCHAEOLOGICAL ASSESSMENT**

GAT Project no. G2055

GAT Report No. 775

**Prepared for Egniol Consulting
on behalf of Dŵr Cymru/Welsh Water**

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Cover: General view over lower end of pipe line route

**Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd**

G2055 RHIWGOCH, RAW WATER MAIN REPLACEMENT WORKS

ARCHAEOLOGICAL ASSESSMENT

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RHIWGOCH, RAW WATER MAIN REPLACEMENT WORKS (G2055)

ARCHAEOLOGICAL ASSESSMENT

SUMMARY

An archaeological assessment was carried out on the route of a raw water pipe line to the east of the Rhiwgoch Water Treatment Works in advance of its replacement. The pipe route runs through a landscape of particular importance, with evidence surviving of settlement patterns and field systems from prehistoric to medieval times. Thirteen Scheduled Ancient Monuments lie within half a kilometre of the pipe route and four lie close its line, all of which are at risk of being impacted by the works if steps are not taken to avoid them. This report provides recommendations for avoiding damage to these sites and the numerous others close to the pipe route. It also recommends a strip, map and sample approach to the open cut trench in which the new pipe is to be laid for part of the route.

1. INTRODUCTION

Gwynedd Archaeological Trust (GAT) was asked by Egniol Ltd on behalf of their clients Dŵr Cymru Welsh Water to carry out an archaeological assessment in advance of a proposed replacement of a raw water main to Rhiwgoch Water Treatment Works. The pipeline starts at Llyn Eiddew Mawr (SH 645337) at a height of approximately 350m, and drops to 250m at SH 605308 over a course of some 4.4km. The route then levels off for a further distance of 2.5km, dropping to 210m at the water treatment works (SH592304) (Figure 1). The upland section of the pipeline is to be replaced using a pipe bursting technique, which will avoid the need for a new pipe trench. The lower section is to be replaced by open trench techniques. The route is shown on drawings NP0910081-101 to 105 issued by Dŵr Cymru. The upland route is currently defined by issue 03 drawings, while the lowland, trenched route follows issue 04.

2. DESIGN BRIEF AND SPECIFICATION

A detailed brief has not been prepared for this scheme, but advice has been received from the Snowdonia National Park Authority (SNPA) Archaeologist, and the requirements of a generic brief will be followed that is similar in scope to the proposed scheme. This design and the assessment will be monitored by the SNPA. This design will conform to the guidelines specified in *Standard and Guidance for Archaeological Desk-based Assessment* (Institute of Field Archaeologists, 1994, rev. 2001 and 2008).

A desk-based assessment is defined as ‘a programme of assessment of the known or potential archaeological resource within a specified area or site on land, inter-tidal zone or underwater. It consists of a collation of existing written, graphic, photographic and electronic information in order to identify the likely character, extent, quality and worth of the known or potential archaeological resource in a local, regional, national or international context as appropriate’ (*Standard and Guidance for Archaeological Desk-based Assessment*, IFA 2008, 2).

The aims of the assessment are:

- to identify and record the cultural heritage within the defined study area;
- to evaluate the importance of what has been identified;
- to recommend ways in which impact upon the cultural heritage can be avoided or minimised.

To comply fully with the aims expressed above it can be necessary to undertake a programme of Field Evaluation following the Desktop study and Field Visit. This is because some sites cannot be assessed by desktop or field visit alone, and additional fieldwork is therefore required. This typically takes the form of geophysical survey or trial excavation, although measured survey is also a possible option. A full programme of assessment and evaluation may therefore consist of:

- Desktop study

- Field walkover
- Initial report
- Field evaluation
- Draft report
- Final report

This phase of the project concerns the first three phases only, and recommendations will be made for any field evaluation required.

3. METHODS AND TECHNIQUES

3.1 Desk top study

The desktop study comprised the consultation of maps, documents, computer records, written records and reference works that form part of the Historic Environment Record (HER), located at Gwynedd Archaeological Trust (GAT), Bangor. The HER includes Cadw's information on listed buildings, and also holds copies of documents from the Mostyn Collection in the Bangor University Archives. The archives held by the Meirionnydd Record Office, Dolgellau were consulted, particularly for information from the relevant tithe maps. The Record Office held a copy of the enclosure award for Llanfair parish but did not have the associated map. The National Library of Wales was consulted to discover whether they held a copy of the enclosure map, but this document does not seem to have survived. A search of the computer index in the National Library of Wales produced no further relevant material. Relevant aerial photographs from the collection at the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW), Aberystwyth were examined. Published and unpublished papers on the area and on relevant aspects of archaeology in North Wales in general were consulted to gain a broader understanding of the study area.

The south-western end of the pipeline route has recently been studied in detail by Rob Evans of Gwynedd Archaeological Trust, who has carried out a desk-based assessment, evaluation by topographical survey and trenching, and is currently undertaking an excavation near the water treatment works. His completed report (Evans 2008) and information still being processed have been used.

Appendix I contains a list of sites, buildings and find spots listed in the GAT HER and Cadw's register of listed buildings around the route of the pipe. Table 1 contains sites close to or on the route of the pipe, table 2 contains sites from the HER lying within about 500m of the pipe route and table 3 contains listed buildings in the same area. These sites are located on figures 2 and 3.

3.2 Field Search

The field search was undertaken along the route of the pipeline on 24th and 25th November 2008. In the upland section this was conducted by George Smith and Jane Kenney with the assistance of Mark Kennedy from Dŵr Cymru to locate the route. The lowland section was inspected by Jane Kenney. On both days the weather was favourable, with the 25th being particularly good for the identification of earthworks as the sun was bright and shining at a low angle. Discussions with Dŵr Cymru during the project lead to an alteration of the pipe route to avoid the scheduled areas around the standing stone and ring cairn. The new route was inspected on the ground on 5th February 2009. At the eastern end of the pipe route the vegetation was heather, rushes and hummock grasses. This vegetation, and the rough, rocky ground, made identification of features difficult. Along the lower parts of the upland section there was more open grassland making features more visible. Gorse could have obscured some features, but there were no extensive areas of gorse along the route. Earlier in the year bracken would have been a significant problem, but it had died back prior to the field search. The lowland section of the route was composed of more or less improved pasture fields, with short, well-grazed grass. Even subtle earthworks were visible in these conditions.

The field search concentrated on the route of the pipe but also investigated sites around this to highlight sites at risk from vehicle movement or possible changes in the line of the new pipe trench. The area investigated varied depending on the topography. Where crags and steep slopes restricted movement the search could be restricted to the pipe route, but in more open areas sites up to a maximum of 70m away were inspected. In particular level areas that might be used as temporary compounds were inspected. In the lowland section field boundaries were used to define the area of search, so that generally a field through which the pipe was to pass was inspected, but adjacent fields were not. This rule was applied pragmatically and in some cases very large fields were not

inspected in their entirety and in others known sites or features identified on aerial photographs were inspected in a field through which the pipe was not planned to pass. The field search was informed by the desk top study, with a particular aim to check on the ground features identified in the aerial photographs. Notes were taken, sketches and measurements were taken of sites of potential archaeological interest and a photographic record was made.

3.3 Report

The available information was synthesised to give a summary of the archaeological and historic background and of the assessment and recommendations, as set out below. The separate features, their evaluation and recommendations are listed separately, and a summary of the overall assessment of the area is given at the end.

The criteria used for assessing the value of features was based upon those used by the Secretary of State for Wales when considering sites for protection as scheduled ancient monuments, as set out in the Welsh Office circular 60/96. The definitions of categories used for impact, field evaluation and mitigation are set out below.

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.

Scheduled Ancient Monuments, Listed Buildings of grade II* and above, as well as those 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 or county importance.

Grade II listed buildings and sites which would not fulfil the criteria for scheduling or listing, 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.

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened.

Category C sites nevertheless merit adequate recording in advance of damage or destruction.

Category D - Minor and damaged sites.

Sites that are of minor importance or are so badly damaged that too little remains to justify their inclusion in a higher category.

For Category D sites, rapid recording, either in advance of 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 usually be no sites remaining in this category.

3.3.2 Definition of Impact

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

None:

There is no construction impact on this particular site.

Unlikely:

This category indicates sites that fall within the band of interest but are unlikely to be directly affected. This includes sites such as standing and occupied buildings at the margins of the band of interest.

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.* a small trench through a trackway or field bank.

Likely:

Sites towards the edges of the study area, which may not be directly affected, but 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 where the removal of a part of the feature could make overall interpretation problematic, *e.g.* roads or tramways where a large part is removed or where a particularly significant section is removed, such as a junction.

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 works.

3.3.3 Definition of field evaluation techniques

Field evaluation is necessary to fully understand and assess most class 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. Various techniques are available depending on the nature of the site to be assessed. The investigation of deposits, such as peat, may require augering to test depth, extent and potential for preserving environmental data. Identifying the date and extent of an artefact scatter on ploughed farmland may involve fieldwalking to recover artefacts in a methodical manner. To achieve a similar result in upland and pasture areas the excavation of a grid of small test pits might be required. Such an approach could also be used to test the depth and nature of deposits.

Three principal techniques are more generally applicable to many situations, and these are topographic survey, geophysical survey and trial trenching.

Topographic survey involves the recording of earthworks and upstanding remains visible on the ground surface. It can be carried out with global positioning technology, an electronic theodolite, hand drawing with tapes, or a combination of any of these. It allows the creation of a plan, rendering the visible remains more understandable and aiding their interpretation and evaluation. It is of particular use over large areas where the relationships of features such as field boundaries and settlements can be identified.

Geophysical survey most often involves the use of a magnetometer, which allows detection of some underground features, depending on their composition and the nature of the subsoil. Other forms of geophysical survey, including resistivity survey and ground penetrating radar might also be of use.

Trial trenching allows a representative sample of the development area to be investigated at depth. Trenches of appropriate size can also be excavated to evaluate category E sites. Trenching is typically carried out with trenches of between 20 to 30m length and 2m width. The topsoil is removed by machine and the resulting surface is cleaned by hand, recording features. Depending on the stratigraphy encountered the machine may be used to remove stratigraphy to deeper levels.

3.3.4 Definition of Mitigatory Recommendations

Below are the measures that may be recommended to mitigate the impact of the development on the archaeology.

None:

No impact so no requirement for mitigatory measures.

Avoidance:

Features, which may be affected directly by the scheme, or during the construction, should be avoided. Occasionally change to the proposed plan is recommended. Particular care may need 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. In this project this applies to the nineteenth century field walls parts of which will have to be dismantled. It is important for the landscape character of the area that these are rebuilt in the original style. In general, the presumption should be in favour of returning walls to their pre-impact state, i.e. tumbled walls are to be left tumbled and not rebuilt.

Basic recording:

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

Detailed recording:

This requires a full photographic record and measured survey prior to commencement of works.

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

Watching brief:

This is a formal programme of observation and investigation conducted by a suitably qualified archaeologist during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. Significant archaeological features discovered during the work which cannot be avoided will need to be fully excavated. The programme will result in the preparation of a report and ordered archive.

Strip, Map and Sample:

The technique of Strip, Map and Sample requires the machine stripping of topsoil and ploughsoil within a defined area to layers capable of preserving archaeological features. The work is undertaken under archaeological supervision. Stripping and removal of the overburden is undertaken in such a manner as to ensure damage does not take place to surfaces that have already been stripped, nor to archaeological surfaces that have not yet been revealed.

A small team of archaeologists will be responsible for subsequently further cleaning defined areas where necessary and evaluating any potential archaeological features. The evaluation will identify significant archaeological features requiring excavation and recording. Isolated features can be recorded at this stage but significant features that cannot be avoided will need to be excavated in detail and this will form a new phase of works.

It is not always easy to identify the nature of features without excavation, therefore although strip, map and sample includes the initial assessment of features; it does not include detailed excavation should the features prove to be archaeologically significant. If a site of archaeological significance is found during the strip, map and sample process then a new design and cost estimate will be required for that site.

The advantage the strip, map and sample technique is that all archaeological features will be found, so it removes all risk. It is best undertaken where the reinstatement of the topsoil is not immediately required, so that the easement does not have to be reinstated and stripped again for construction. This method typically results in the identification of a large number of features such as drains, ditches, former field boundaries, the holes caused by the removal of trees, and casual pits etc.

Detailed excavation:

Where the requirement for detailed recording or the results of the strip, map and sample evaluation suggest that full excavation of a feature or features is necessary this would be carried out to a project design based on best practice. This normally involves the full excavation of significant small features and the partial excavation of

ditches and other large features. Detailed plans and sections will be drawn, a full photographic record will be made and detailed notes will be written describing each context. The main aims are to establish the date and function of features and to establish the stratigraphic relationships between features. On a complex site this can be a long and labour intensive process.

4. ARCHAEOLOGICAL RESULTS

4.1 Topographic description

The pipe line runs from the natural lake of Llyn Eiddew Mawr at 355m OD. It initially follows closely the stream of Nant Steicyn, and then traverses the upper slopes of the western side of the valley of the Afon Artro. It descends, through undulating terrain, to a plateau at about 240m OD, over 2.5km west of the river. The Water Treatment Works, at 210m OD, lies just where this plateau starts to slope down towards the narrow coastal plain and the coast of Cardigan Bay.

This landscape is defined by the Cambrian rocks of the Harlech dome (Bowen and Gresham 1967, 1), which the British Geological Survey describes as Cambrian shales, sandstones and quartzites (BGS 1930). The rugged laminations of Carreg y Saeth sloping at a steep angle at the foot of Rhinog Fawr demonstrate the geological history of uplift, distortion and erosion. Glaciation shaped these rocks into the peaks of the Rhinogau, which can be clearly seen from many points on the pipe line route. The soils have developed on boulder clay and exposed undifferentiated drift, with peat blanketing much of the upland section of the route. The whole area is scattered with a large numbers of glacial erratic rocks. In the improved fields these have been collected and heaped into piles, many of which have been created recently with heavy machinery.

4.2 Archaeological and historical background

This area is one of outstanding archaeological richness. The marginal nature of the agriculture here has enabled monuments to survive as upstanding structures rather than buried remains. Even in the more improved pastures ancient field walls and settlements can be seen. The presentation of maps with dots to represent the location of sites gives a false impression of isolated monuments, whereas the reality is that swaths of ancient landscape are preserved. In some areas, especially around the hut circle settlement of Muriau Gwyddelod (PRN 1054-1056¹), settlement sites can be joined together by following ancient field boundaries beneath the more recent field systems. In places these boundaries can still be seen as low walls but where these have been removed scarps defining the field edges can be identified on aerial photographs. While the relict landscapes are particularly impressive from the Iron Age and Romano-British periods, traces of the medieval landscape can also be seen. This is more extensive than may be initially apparent as many of the present field walls probably follow the outlines of medieval fields. The more recent landscape from the last two or three centuries is naturally the most complete, with the hills scattered with small cottages and sheepfolds, no longer used, and the lower fields have barns, many of eighteenth century origin.

4.2.1. Earlier Prehistoric

No Mesolithic sites are known in the area but the presence of charcoal in a valley mire studied by Chambers and Price (1988) suggests Mesolithic clearance of woodlands possibly causing the local increase in alder carr observed in the pollen record. Neolithic tombs are rare in Merioneth but a group of six clusters around the mouth of the Afon Artro. These are long cairns with similarities to the Cotswold-Severn cairns (Bowen and Gresham 1967, Smith 2003), although that closest to the study area near Gwern Einion (PRN 1057, SAM Me011) is defined as a portal dolmen by Lynch (1969, 125). Kelly (1982, 130) suggests that the standing stone at Hengaeau (PRN 1060) may be the remains of a similar burial chamber. This lies about 1km south-west of our area.

Very few other Neolithic sites are known, and the few stone axes that have been found are restricted to the coastal belt (Bowen and Gresham 1967). However, the lack of sites of this period is most probably due to limited excavation in the area. A Neolithic hearth, probably representing the remains of a small settlement, was identified under a later settlement excavated on Moel y Gerddi (Kelly 1988, 107). Chambers and Price (1988)

¹ PRNs (primary record numbers) identify sites within the Gwynedd HER, the sites also have an NPRN (national primary record number) to identify them in the National Monument Record (NMR). Both numbers are listed in the tables in appendix I.

detected episodes of Neolithic woodland clearance near Moel y Gerddi, probably relating to early farming activity.

Gresham (1967, 286) states that burnt mounds, usually one of the most common types of Bronze Age site in upland Wales, are very rare in Merioneth, but more have been found since he wrote and two (PRNs 5943 and 6159) lie close to the pipe route. More are likely to be found as more survey work is carried out. A site initially thought to be a burnt mound (PRN 20613) is currently under excavation by Gwynedd Archaeological Trust next to the Rhiwgoch Water Treatment Works, but its final interpretation is not yet known. Occasional objects dating from the Bronze Age have been found including a bronze palstave from near Llanfair (PRN 3904) and a hoard of palstaves from Harlech (PRN 2906) (Bowen and Gresham 1967). The RCAHMW Inventory also records a bronze 'celt' found at Cilbronrhydd and exhibited at a meeting of the Cambrian Archaeological Association in 1866 (RCAHMW 1921, 111). More spectacularly a gold torque (PRN 2896) was found in a garden near Harlech Castle in 1692 and is now in the National Museum of Wales (OS card SH 53 SE 3).

Most Bronze Age activity in the area is represented by monuments such as standing stones, stone circles and burial cairns. While there are many round cairns there are also more unusual types including ring cairns and cairns with upright orthostatic kerbs, like that at Bryn Cader Faner (Bowen and Gresham 1967, 87). Some ring cairns also make use of upright slabs. One such cairn (PRN 1008) was excavated on Moel Goedog and proved to enclose several cremation burials in urns (Lynch 1984). Within the study area is the ring cairn Bedd Gurfal (PRN 1007). This also has a ring of upright stones (Bowen and Gresham 1967, 88; Kelly 1982, 132). Only 8m from the pipe line is the Ffridd Fron kerbed cairn (PRN 5212). This has a ring of upright slabs, in this case forming a kerb to the outside of a small round cairn.

Standing stones, normally an enigmatic monument type, appear in this area to mark a prehistoric routeway. This route running from the mouth of the Artro over the hills to the Trawsfynydd Basin was suggested by Gresham (1967) and has been accepted by later writers (e.g. Lynch 1984, 34-35). It is best marked over the uplands where cairns, such as the pair of ring cairns (PRN 1008 and 1009) on Moel y Goedog, indicate the route as well as standing stones. It is most convincingly defined by the seven standing stones along Y Fonllech Hir, starting with Garreg Standing Stone (PRN 1049) immediately adjacent to the pipe line. The route is still used as a road and then footpath, and may have been further marked to the south-west by a standing stone, now removed (PRN 1048).

4.2.2 Late Prehistoric / Romano-British

Hut circle settlements and their associated field systems are one of the outstanding features of the archaeology of the Ardudwy Uplands. Roundhouses can be difficult to date. Excavation has revealed some Bronze Age examples and they probably continued into the early medieval period and can be easily confused with shelters and other structures of later periods (Smith 1999). Most stone-built roundhouse settlements are assumed to be of the Romano-British period as many excavated examples have produced Roman material but Ghey *et al* (2007) argue that many were probably of an Iron Age date. Two circular enclosures with central stone-built roundhouses have been excavated at Moel y Gerddi and Erw-wen not far from the study area. The excavations suggested a date in the first millennium BC for the main phase of occupation at both sites and in both cases the stone roundhouse was preceded by a timber one (Kelly 1988). Excavations on lowland sites have demonstrated that timber and clay-walled roundhouses were probably more common than stone (Ghey *et al* 2007), but these are difficult to recognise without excavation, and upland field walking will only reveal stone structures, or possibly level platforms.

The most extensive system of huts, enclosures and fields in the area is the scheduled site of Muriau Gwyddelod (PRN 1054-56). Although the scheduled area is 700m in length the ancient landscape can be seen continuing much further. The field boundaries extend into the fields just west of the water works and includes a trackway known as Y Ffordd Wyddelig (PRN 2901). This is recorded on the HER as early medieval but there is no reason not to associate it with the rest of the field system around the hut circle settlement. Other hut circle settlements and enclosures in the area, such as PRN 1050, 1064, 1066, 1071 and 2903, are all joined to each other and to Muriau Gwyddelod by field walls, some only visible from the air as slight scarps through improved fields.

The undulating ground to the south and south-west of Moel y Gerddi is also rich in hut circle settlements. There is a group of these settlements just to the north of Ffridd Farm that have been recorded from aerial photographs but have not been studied or surveyed on the ground. Few such sites are known from higher levels but the existence of an extensive roundhouse settlement (PRN 5214) at 230m OD and a small number of other sites on

the moorland suggest that the scarcity is due to the current difficulty of accessing this area rather than a lack of occupation in the past.

On the aerial photographs small areas of narrow ridge and furrow can be seen around some hut circle settlements, particularly PRN 1004. This site is at 290m OD, not beyond the limit of medieval cultivation, but the ridge and furrow could be contemporary with the settlement. Crew and Musson (1996, 23) have identified ridge and furrow probably contemporary with a hut circle settlement in Cwm Prysor, near Trawsfynydd. Pollen analysis has shown that woodland clearance started in the early Bronze Age and that the uplands may have been fairly open in the Iron Age, although regeneration occurred locally (Chambers and Price 1988).

4.2.3. Roman period

Some of the roundhouse settlements probably continued in use throughout the Roman period but there is little evidence of a Roman military presence in the area. The Roman road between Tomen-y-Mur and Pennal (Margary 1996, 354-5) takes an inland route about 6km to the east of the study area. However, late Roman coin hoards found at Harlech Castle and Llanbedr (Bowen and Gresham 1967) do suggest some trade or other contact between the Ardudwy area and the Roman army.

4.2.4. Early Medieval

It is likely that some of the roundhouse settlements were occupied into the early medieval period but firm evidence for this has proved hard to find. The proximity of later medieval long huts to hut circle settlements has been taken to suggest continuity of occupation. However, Smith considers that the relationship is due to reuse of favourable locations and that in the uplands, at least, there is no good evidence for continuity of settlement (Smith 1999, 48). The early medieval settlement pattern is, therefore, at present, unknown.

While pollen evidence shows that woodland clearance continued throughout the Roman period in the area there was some regeneration in the early medieval period, perhaps suggesting less intensive use, especially the uplands, but clearance continued from the mid 12th century (Chambers and Price 1988).

The clearest evidence for early medieval activity in the area are early Christian inscribed stones. Two of these are built into the fabric of Llandanwg old church (Nash Williams 1950, 278-9), and two more stones of similar date have recently been found there (Davidson *per comm.*). It has been suggested this church was at one time a *clas* church, acting as a mother church or Minster to the area (Pryce 2001).

4.2.5. Medieval

The study area lies within the parish of Llanfair in the commote of Ardudwy. The commote was divided into the half commotes of Is Artro and Uwch Artro, Llanfair being in the former (Thomas 2001). Ardudwy was a relatively rich commote, being the second most productive in Merioneth after Tal-y-bont (Thomas 2001, 200).

The uplands and lowlands worked as part of an integrated agricultural system and it is notable that all the parishes in this area run from the coast inland to maximise land of all types within the parish boundary. In the twelfth and thirteenth centuries there may have been arable cultivation up to 450m OD but the limit of cultivation then retreated until it was unlikely to be above 300m by 1600 (Thomas 2001, 178). This still allows the possibility of cultivation along much of the pipe line route, however, woodland was likely to be extensive even on the high ground. The nineteenth century field names recorded in the tithe schedule may give hints of previous agricultural and environmental conditions. Within the study area the use of 'defaid' (sheep) in field names suggests the importance of sheep. The tithe map shows numerous arable fields and names such as 'talar' (headland of a ploughed field) may suggest these are of medieval origin. The farm name of 'Ffridd Llwyngwrfel' indicates the presence of woodland, 'llwyn' means grove. Some of the small patches of ridge and furrow visible on the aerial photographs may be remnants of medieval cultivation, although they could represent small garden plots associated with post medieval cottages.

Ancient field walls can be seen in places across the study area. It is difficult to be sure whether these are prehistoric or medieval. A rectangular field near the Water Treatment Works seems to be related to possible hut circles (feature 42), but the alignment of the scarps (features 57 and 85) identified in the current field search are aligned in a similar orientation to present field boundaries and could be medieval. Other denuded walls e.g. feature 82) seem to be related to medieval long huts (PRN 5490). Many of the present field walls follow wandering and irregular routes. Many of these are shown on the 1840 tithe map but are better represented on

the 1889 First Edition Ordnance Survey maps (figures 4 and 5). Some shown on the latter are not indicated on the former, although their character suggests that they originated before the nineteenth century. It is likely that they were not in use in 1840 and so are not shown but were clearly visible on the ground to the more thorough Ordnance Survey surveyors. Some of these wandering walls were fully rebuilt in the nineteenth century and their construction is of the same character as more regular walls, but others are largely tumbled down and robbed and must have been of significance in the system that pre-dated the nineteenth century one. A careful assessment of surviving walls could identify a fairly complete field system dating at least to the later medieval period, and this may suggest that many of the present farms are of medieval origin, despite the lack of surviving buildings that predate the eighteenth century.

Some medieval settlements are known in the area. The excavations at Erw-wen demonstrated the re-use of the site sometime between the thirteenth and sixteenth centuries, when the roundhouse was converted into an animal pen and a rectangular platform house was constructed (Kelly 1988, 128, 140). The earthwork and rubble remains of long huts or rectangular hut platforms have been dated to the medieval period since Gresham's work in Caernarvonshire (Gresham 1954). These often indicate isolated dwellings and one of the best in the study area is adjacent to the waterworks (feature 39, PRN 20612), and was only identified during an earlier phase of the present works. Several of the round hut settlements have medieval fields or houses constructed over them.

The long huts at higher altitudes were presumably hafodau (Gresham 1954), the summer dwellings used as part of the hafod and hendre system of annual transhumance. At least some of the family would inhabit a hafod in the hills to milk their livestock while they were on the mountain pastures in the summer. They would return to the family home (hendre) at lower altitudes for the winter. In Caernarvonshire documents record many hafodau in the sixteenth century but they are mentioned as early as the thirteenth century. However the practice was declining by the eighteenth century (Davies 1979, 26-29, 18).

Beyond the limits of the study area the village of Llanfair was in existence and had a church by 1188, when it was visited by Gerald of Wales and Archbishop Baldwin (Davidson 2001, 353). John Speed marks Llanfair on his 1610 map as 'Llanunier' and had surveyed in Llyn Cwm Bychan, Llyn Eiddew Mawr and Llyn Eiddew Bach as 'Llyn y combe' and the Llynæ Eithaye' respectively (Merioneth RO Z/M/1251/10). An early foundation for Llandanwg church is suggested by its original circular cemetery that is now buried by sand, though much of the present church appears to be of thirteenth century date. A cross slab in the west wall probably dates from the ninth to eleventh century (ibid. 343-4). Harlech Castle, built in the thirteenth century by Edward I, dominates the area, surrounded by the medieval town.

4.2.6 Post-Medieval

Many of the farm houses in and near the study area can be dated back to the eighteenth century and that at Gerddi Bluog may date to the late seventeenth century (Cadw listed buildings information). They are all shown on the 1840 tithe map, which also indicates a pattern of fields almost identical to that of today (figures 6 and 7). The only significant variations are around the farm of Ffridd Llwyn Gwerfyl (now Ffridd Farm), where the 1840 fields are difficult to relate to the current boundaries. Careful comparisons suggest that this is more likely to be due to surveying errors in this part of the tithe map than to significant changes in field boundary. There is further confusion due to present and 1889 OS mapping including many boundaries that seem to have gone out of use before 1840 but that are still visible on the ground.

The tithe maps for Llanfair parish (dated 1840) and its schedule (dated 1839) and that for Llanfihangel y Traethau and Llandecwyn (1842, covering the north-eastern end of the study area) are full of agricultural and social information (figures 6 and 7). The grain production is listed in bushels showing that oats was the most productive cereal, accounting for 48% of arable production, barley for 33% and wheat was much less commonly grown at 19%. Despite all the land studied being over 210m the tithe map shows arable features scattered all along the lower section of the pipe route; with arable fields marked up to 280m OD. The fields are grouped around the farmhouses with arable, pasture and in some cases meadow being available close by. This is best seen for Gerddi Bluog. Some of the fields in which ridge and furrow can be seen, e.g. field no. 350 on the tithe map (feature 60) are listed as pasture in 1839, so larger areas may have been under arable cultivation earlier in the nineteenth century, perhaps as a response to the Napoleonic Wars.

An enclosure award was drawn up for the parishes of Llanbedr and Llanfair in 1836 (Merioneth RO QR/En/5). Most of the land must have been enclosed by this time but the award divided commons, marsh lands and waste land between landowners with rights to their use. Much of the land was allocated to the king and larger landowners bought this from the king enabling them to consolidate holdings. The landowners had to enclose

and drain their holdings and maintain private roads crossing their land. Each farm had an allotment of the common land in the uplands, and field walls in the uplands must have been built after 1836. Many walls elsewhere were probably rebuilt at around this time, as many are of a similar style. Although the uplands were divided up between individual landowners turbarry rights were still maintained. Peat must have been an important fuel and the Llanfair tithe map labels a track through the uplands as leading to turbarries in Llanfihangel parish, to which, presumably Llanfair also had some rights.

The Mostyn Estate held some land in the area, some bought from the Vaughans of Cors y Gedol in 1849 (NLW Sale Catalogues 177). The Estate owned the large fields on the moorland around Llyn Eiddew Mawr in the parish of Llanfihangel (Mostyn MSS 8604) and land around, but not including the farm of Cwm Mawr in Llanfair parish (Mostyn MSS 8606). However, the following table of owners of farms in the study area shows that the land was not dominated by a single estate. The owners of some farms, such as Robert Roberts at Rhiwgoch, were small farmers and owner occupiers.

Farms (name on tithe map)	Modern name (if different)	Owners on 1839 tithe schedule
Cilybronrhydd	Cilbronrhydd	William Parry
Cwm Mawr		Mostyn Estate
Drwsyrymlyd	Drws yr Ymlidd	Elinor and Elizabeth Edwards
Ffridd Llwyngwrfel	Ffridd Farm	Mostyn Estate
Gerddibluog	Gerddi Bluog	Jaine Roberts
Maesylfor	Maesyraelfor	Griffith Griffiths
Rhiwgoch		Robert Roberts
Rhydyreirin	Rhyd-yr-Eirin	Mostyn Estate
Tyddyn Du		Edward Owens
Tyddyn rhyddyd	Tyddyn Rhyddid	William Lloyd
Tyddyn y felin	Tyddyn Felin	Griffith Griffiths
Tyddyn y gwynt	Tyddyn Gwynt	Elinor and Elizabeth Edwards

The road to Talsarnau is shown on the tithe map and as discussed above is possibly in part a very ancient route. The road to Cwm Bychan was not a continuous track in 1839 but paths must have joined the two sections shown and allowed access to farms in between. Both sections of track shown on the tithe map seem to follow the present road line closely, except for at the western end where the track joined the Talsarnau road. The track used to run straight here, keeping south of the stream, whereas now it turns towards the north-west.

The hafod and hendre system had largely gone out of use by the nineteenth century (Davies 1979), but the existence of small cottages on the ffridd, often close to sheep folds, demonstrates that the uplands were still extensively used. Most people probably travelled to the upland pastures and brought down livestock or milk the same day, but the cottages suggest occasional overnight stays occurred. Trackways, such as feature 13, must have been quite heavily used for livestock management and other tracks gave access to the turbarries. Peat cutting presumably took place every summer, and numerous peat stacks, some provided with flat, dry platforms can still be identified near productive peat bogs.

4.3 Statutory and non-statutory designations

The development area lies within the Snowdonia National Park and the Arduwy Landscape of Outstanding Historic Interest (HLW (Gw) 2), where it is described as ‘a large, exceptionally rich and well-studied landscape, situated on the western flanks of the Rhiniog Mountains, containing extensive relict evidence of recurrent land use and settlement from prehistoric to recent times’ (Cadw 1998, 76). There are 13 Scheduled Ancient Monument within the study area, but only 4 of these are close to the pipe line route. These are the Garreg standing stone (Me57b), the Garreg ring cairn (Me107), the Ffridd Fron kerb cairn (Me208), and a hut circle settlement (Me166). There are 11 listed buildings in the study area, though none lie immediately adjacent to the pipeline. The scheduled ancient monuments and listed buildings are listed in appendix I.

4.4 The Archaeological Survey (Figures 8 to 12)

Ninety seven features were identified directly on or close to the route of the raw water pipe and the proposed route of the new pipe trench. These are shown on figures 8 to 12 and described below with recommendations for further assessment and mitigatory measures, where appropriate. Those features that did not previously have PRN numbers have been allocated them and they will be added to the HER. PRN numbers of these new features are not shown on figures 8 to 12 for clarity but are listed below.

Feature 01 Wall PRN 29221

SH 64260 33580

Period: Post medieval

Category: D Impact: Slight

Drystone field wall, 1m high, with stream passing beneath. Irregular coursing, coping stones survive in places. Open work construction where stream passes through.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 02 Hut/shelter PRN 29222

SH 64045 33399

Period: Post medieval?

Category: C Impact: Slight

Small sub-circular, drystone structure, about 4.5m in diameter externally, and up to 0.6m high. Roughly built but with lowest stones well embedded and placed. Almost a complete circle with no obvious entrance.

Damaged on W side by pipe trench

Recommendations for further assessment: None

Recommendations for mitigatory measures: Fence off and avoid

Feature 03 Wall PRN 29223

SH 64020 33360

Period: Post medieval

Category: D Impact: Slight

Drystone field wall, c.1m high. Irregular coursing, very few coping stones survive. Stream passes under low opening.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 04 Peat stack PRN 29224

SH 63921 33360

Period: Post medieval

Category: C Impact: None

Raised mound, measuring c.10m by 5m and 0.4m high, on edge of bog with occasional stones around edge, most of mound is of stone-free peat. This does not seem to be the same as PRN 6162, which was not located. Close to pipeline

Recommendations for further assessment: None

Recommendations for mitigatory measures: Fence off and avoid

Feature 05 Shelters and enclosures, peat stack? PRN 29225

SH 63862 33272

Period: Post medieval

Category: C Impact: None

Group of small shelters with associated small enclosures, one of which could be a raised platform for turf stacks. The walls survived to a maximum of 1m high.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 06 Peat stack PRN 29226

SH 63849 33370

Period: Post medieval

Category: C Impact: None

Approximately circular raised area of peat on edge of bog, c.10m in diameter, and 0.3m high. Close to the pipe

route and should be well fenced.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence and avoid*

Feature 07 Peat stack PRN 29227 (plate 1)

SH 63823 33345

Period: Post medieval

Category: C Impact: None

Small oval stone revetted platform, measuring c.6m by 3.5m, and 0.5m high. On hill slope so should be easily avoidable.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 08 Hut circle PRN 1176 (plate 2)

SH 63731 33295

Period: Prehistoric

Category: A Impact: None

A circle, c.5.5m in diameter and 0.5m high, defined by low overgrown walls with possible entrance on SE side. Well away from pipe route. These features (8, 9 and 10) are clearly those recorded as PRN 1176 and shown in the plan published in Kelly (1982), despite the difference in grid reference.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 09 Hut circle PRN 1176

SH 63785 33285

Period: Prehistoric

Category: A Impact: None

Partial circle, c.10m in diameter and 0.2m high, defined by slight, overgrown wall, with possible entrance on E side. Seems quite large for a stone-built hut circle. Well away from pipe route

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 10 Hut circle PRN 1176

SH 63750 33290

Period: Prehistoric

Category: A Impact: None

Complete circle, measuring c.9m by 8m and 0.2m high, defined by slight, overgrown wall, with no visible entrance. Seems quite large for a stone-built hut circle. Well away from pipe route. Aerial photographs suggest there may be a fourth similar feature continuing the line to the west, but it was not searched for on the ground and was quite indistinct on the photograph. It seems unusual that these features are in such a straight line if they are standard hut circles, and they may be worth reassessing in the future.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 11 Small building PRN 29228

SH 63675 33210

Period: Post medieval

Category: C Impact: None

Unroofed rectangular drystone building, entrance in N side, terraced into slope. The building measures 7m by 4.5m and the walls stand up to 1.4m high. Appears to be a cottage, probably a summer dwelling (hafod).

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 12 Denuded wall PRN 29229

SH 63691 33203

Period: Prehistoric?

Category: B Impact: Slight

Straight section of boulder wall, 7m long and 1m wide, mainly just single stone high (0.5m). Associated with area of small clearance cairns. Pipe route on edge of area of clearance cairns. Vehicles should stay strictly to pipe route in this area.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Avoid

Feature 13 Trackway PRN 29230

SH 63592 33058

Period: Post medieval

Category: C Impact: None

Trackway aligned NE-SW with revetted E side. It is over 60m long and 3m wide, and the revetment is up to 0.5m high. Links the cottage (feature 11) with the sheepfold (feature 14). Vehicles must not be tempted to use this track.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Avoid

Feature 14 Multicellular Sheepfold PRN 29231

SH 63557 32996

Period: Post medieval

Category: C Impact: None

A group of conjoined sub-rectangular stone-walled compartments, measuring 19m by 15m maximum, with walls mostly still standing to full height of c.1.5m.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Avoid

Feature 15 Cairn field PRN 29232 (plate 3)

SH 63563 32953 and SH 63590 32958 and SH 63599 32922 and SH 63582 32916

Period: Prehistoric

Category: A Impact: Slight

Cairn field containing at least 4 fairly substantial cairns, c.5m in diameter and up to 0.5m high. These could be clearance cairns but are large enough and well enough defined to be burial cairns. The hut circle (PRN 6160) was not located but suggests prehistoric occupation in the area. The pipe route passes through the edge of this area. Vehicles should keep strictly to the pipe route here.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Fence and avoid

Feature 16 Small building PRN 29233

SH 63310 32699

Period: Post medieval

Category: C Impact: None

One roomed ruined and roofless cottage, measuring 5.5m by 4m with walls 1m high. Simple stone-built dwelling, with entrance to E, probably a summer dwelling (hafod). Some distance from pipe route.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Avoid

Feature 17 Wall PRN 29234

SH 63340 32580

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c. 1m high. Irregular coursing, most coping stones survive.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Reinstatement

Feature 18 Burial cairn PRN 29235 (plate 4)

SH 63321 32527

Period: Prehistoric

Category: A Impact: Slight

Small oval cairn, c.4m by 3m, 0.3m high, with an elongated hollow in the centre and possible traces of kerbing on N side. Site may be used as a temporary compound in which case this should be fenced off.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Fence off and avoid

Feature 19 Wall PRN 29236

SH 63050 32220

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing, sections of coping stones survive.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 20 Wall PRN 29237

SH 62770 31970

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Above pipe crossing it is particularly well constructed with all the coping stones. Near the pipe crossing it is rougher and many of the coping stones are lost.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 21 Wall PRN 29238

SH 62520 31670

Period: Post medieval, medieval?

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing using many slabby stones, most coping stones survive. Change in coping stone style up hill from pipeline crossing. Part of a wall following an irregular line, and it probably follows route of an ancient wall. A small evaluation trench is recommended to check for traces of an earlier wall and deposits sealed beneath the wall.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Evaluation trench and reinstatement*

Feature 22 Wandering wall PRN 29239

SH 62545 31629

Period: Medieval?

Category: C Impact: None

Irregular, roughly built wall, no more than 1m high, joining outcrops and scarps around small valley basin. A short spur from the wall creates a small enclosure with a rock outcrop.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 23 Wall PRN 29240

SH 62410 31560

Period: Post medieval

Category: D Impact: Moderate

Dry stone field wall, c.1.5m high. Irregular coursing. No coping stones survive. Narrow gap between wall and crag so part or all of wall may have to be demolished and rebuilt. It is recommended that basic recording be carried out along the length of the wall to be demolished.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Basic recording, reinstatement*

Feature 24 Enclosure PRN 29241

SH 62389 31476

Period: Medieval?

Category: C Impact: Moderate

Small enclosure, measuring 12m by 8m and up to 0.75m high, defined on two sides by a rough boulder wall and a revetment and on the third side by crags. Only the foundation of the wall survives. This site is adjacent to the pipe route and risks damage by vehicles. Clear fencing will be necessary to avoid damage.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence off and avoid*

Feature 25 Wandering wall PRN 29242

SH 62350 31370

Period: Medieval?

Category: C Impact: None

Short section of very rough walling, no more than 0.5m high, along top of a crag. Although close to the pipe route this is on the top of a crag and inaccessible from the route.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 26 Wall PRN 29243

SH 62290 31320

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, up to 1m in height. Irregular coursing. Quite dilapidated and completely destroyed where path crosses it. The wall is to be reinstated to its present condition, i.e. the tumbled section is not to be rebuilt and tumbled stones are to be left as a valuable habitat.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 27 Wandering wall PRN 29244

SH 62270 31270

Period: Medieval?

Category: C Impact: None

Tumbled enclosure wall, no more than 1m high, running from near the path towards the stream. May form an enclosure amongst the rock outcrops.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 28 Wall PRN 29245

SH 62130 31090

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing. Well built with neat end. Largely collapsed on S side of pipe line.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 29 Wall/cairn PRN 29246

SH 62088 31083

Period: Post medieval

Category: D Impact: None

Short section of walling, 1m high, revetting the hillside. May be a way of retaining cleared stone tidily on a steep slope.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 30 Wall PRN 29247

SH 61980 31060

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing. Few coping stones survive.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 31 Wall PRN 29248

SH 61930 31060

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 0.8m high. Irregular coursing using slabby stones. Some very large boulders as foundation. No coping stones survive.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 32 Sheepfold PRN 5931

SH 61923 31067

Period: Post medieval

Category: C Impact: None

Sub-rectangular sheepfold, measuring 10m by 8m with walls 1.2m high, neatly built of local slate slabs. Mostly intact. This is probably the rectangular structure recorded as PRN 5931.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 33 Wall PRN 29249

SH 61840 31000

Period: Post medieval, medieval?

Category: D Impact: None

Dry stone field wall, 0.6m high. Irregular coursing. No coping stones survive. Much reduced in height. Part of a wandering wall, so recent wall may follow an ancient line. Should not be impacted by pipe works.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 34 Hut platform PRN 5213 (plate 5)

SH 63043 32150

Period: Medieval

Category: B Impact: Slight

Substantial platform, measuring 8m by 6m and up to 1m high, revetted by large stones on E and S sides. Aligned c.E-W on small shelf at base of steep slope. One large stone may be the remains of a long hut wall. Cut by pipe trench on W side. This site must be clearly fenced off and vehicles should stay exactly over the pipe or reroute around the feature.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence off and avoid*

Feature 35 Ffridd Fron kerb cairn PRN 5212 SAM number Me208 (plate 6)

SH 63161 32395

Period: Prehistoric

Category: A Impact: None

Burial cairn with central cist and kerb of upright stone slabs. It measures 4.5m in diameter and stands 0.5m high. NB. The Original PRN co-ordinates are inaccurate, but the SAM area is placed correctly.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence and avoid*

Feature 36 Wall PRN 29250

SH 62360 31440

Period: Post medieval

Category: D Impact: Moderate

Dry stone field wall, c.1.5m high. Irregular coursing. Most coping stones survive. Very close to a crag and will have to be removed and rebuilt. It is recommended that basic recording be carried out along the length of the wall to be demolished.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Basic recording and reinstatement*

Feature 37 Wall PRN 29251

SH 62320 31370

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing. Some coping stones survive. Pipe route passes through a gate, but some of wall may have to be demolished

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 38 Wandering wall PRN 29252

SH 59257 30410 to SH 59282 30464

Period: Medieval

Category: B Impact: Slight

Rough boulder wall with rather wandering line. Surveyed by Rob Evans and tested by evaluation trench and subsequently mitigated through excavation. Mitigation excavation showed the potential for the presence of further buried boundary features in the vicinity that are not visible on the ground surface. The aerial photographs suggest it continued a little further to the NE, but it is very difficult to see on the ground as it crosses a rocky outcrop. Its total length is at least 64m and it is about 1.5m wide and up to 0.5m high. This feature must be fenced off if the pipe route is to by-pass the long hut (feature 39). The projected NE end of this feature may be cut through by the pipe trench and would require evaluation through strip, map and sample followed by full excavation of any features present as appropriate.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence and avoid. Evaluation of area where potential continuation of the wall is cut through by strip, map and sample method followed by full excavation of any features present as appropriate.*

Feature 39 Long hut PRN 20612

SH 59246 30455

Period: Medieval

Category: B Impact: None

Rectangular structure with low, overgrown walls, about 15m long, 9m wide and 0.5m high. Confused by earthmoving and stone dumping at S end. Recorded by Rob Evans as feature 1. The proposed route of the pipe trench runs between the long hut and the field wall with very little room. The pipe trench route should avoid the long hut, passing to its east.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Fence and avoid*

Feature 40 Wall PRN 29253

SH 59350 30550

Period: Post medieval, medieval?

Category: D Impact: Slight

Dry stone field wall, 1m high. Irregular coursing. No coping stones survive. Seems to have been reduced. Part of a wandering wall, possibly built along an ancient wall line. Deposits beneath the wall should be specifically studied as part of the strip, map and sample process.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Strip, map and sample, and reinstatement*

Feature 41 Wall PRN 29254

SH 59360 30560

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing. No coping stones survive.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 42 Enclosures and possible hut circles PRN 29255

SH 59430 30560

Period: Prehistoric?

Category: B Impact: None

Complex group of small enclosures and possible hut circles underlying a sheepfold. The walls stand up to 0.7m high and some contain large boulders. They seem to be related to a rectangular field to the SW. All are visible both on the ground and from the APs. Some distance from pipe route so should be easily avoided

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 43 Sheepfold PRN 29256

SH 59350 30561

Period: Post medieval

Category: C Impact: None

Rectangular enclosure built of large boulders in corner of field walls. It measures 10m by 5m and the walls stand 1m high.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 44 Hut circle? PRN 29257

SH 59412 30588

Period: Prehistoric?

Category: B Impact: None

Arc of large boulders, measuring 7m by 4m and up to 1m high, forming a possible hut circle partly damaged by construction of sheepfold. Part of feature 42?

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 45 Hollow/pond PRN 29258

SH 59347 30580

Period: Post medieval

Category: D Impact: None

Small oval hollow, 5m by 4m and 0.5m deep, possibly a pond for livestock, although there is a stream nearby.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 46 Wall PRN 29259

SH 59530 30770

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1.5m high. Irregular coursing. No coping stones survive.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 47 Trackway PRN 29260

SH 59542 30773

Period: Post medieval

Category: C Impact: Slight

Track leading to Drws-yr-Ymladd. Unmade track, 3m wide, walled for much of its length but not where pipe trench will cross. On 1889 OS map and 1840 tithe map. Inspect as part of strip, map and sample process where pipe trench cuts the track.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Strip, map and sample where impacted by pipe trench*

Feature 48 Heap of stones PRN 29261

SH 59618 30828

Period: Post medieval

Category: D Impact: None

Large low heap of stones on uneven ground. Possibly there was some quarrying activity here before the stones were dumped but nothing clear.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 49 Wall PRN 29262

SH 59680 30870

Period: Post medieval

Category: D Impact: None

Dry stone field wall, c.1.5m high. Irregular coursing. Well built with rounded boulders; the type of stone used seems to be related to that available in the adjacent fields rather than being a chronological indicator. Most coping stones survive. Preferred pipe route altered so this wall will not be impacted.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *None*

Feature 50 Ring cairn? PRN 29263 (plate 7)

SH 59848 30949

Period: Prehistoric

Category: A Impact: None

Low circular bank, about 14m in diameter and up to 0.4m high, enclosing flat stone-free area. Possible slight concentric ditch and bank to W and traces of kerb stones in outer face of bank. Near prominent rock outcrop. Seems too large to be a hut circle but is much smaller than the Garreg ring cairn (feature 52, PRN 1153), however, the possible ditch and proximity to PRN 1153 suggests a ring cairn. During the assessment process it was decided to route the pipe trench to the north of the road at this point avoiding this feature and the scheduled areas.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid.

Feature 51 Garreg Standing Stone PRN 1049 SAM number Me57b

SH 59886 30968

Period: Prehistoric

Category: A Impact: None

Standing stone, scheduled ancient monument (Me57b). PRN co-ordinates are 9.5m from stone's actual location and centre of SAM area is 4.5m away. During the assessment process it was decided to route the pipe trench to the north of the road at this point avoiding both scheduled areas.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 52 Garreg Ring Cairn PRN 1153 SAM number Me107

SH 59906 30953

Period: Prehistoric

Category: A Impact: None

Large, quite well defined ring cairn (c.20m in diameter), scheduled monument (Me 107). During the assessment process it was decided to route the pipe trench to the north of the road at this point avoiding both scheduled areas.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 53 Hollows PRN 29264

SH 59944 30924

Period Unknown

Category: E Impact: None

Very slight undulations, no more than 0.3m deep, possibly just caused by clearing large boulders from field. Recorded in checking area S of ring cairn for features in case pipe route needs to run through this area.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 54 Heap of stones PRN 29265

SH 59940 30990

Period: Modern

Category: None Impact: None

Pile of very large boulders. Modern, of no archaeological interest.

Recommendations for further assessment: None

Recommendations for mitigatory measures: None

Feature 55 Wall PRN 29266

SH 59970 31010

Period: Post medieval

Category: D Impact: None

Dry stone field wall, c.1m high. Irregular coursing. Rather poorly built. All coping stones lost. Preferred pipe route altered so this wall will not be impacted.

Recommendations for further assessment: None

Recommendations for mitigatory measures: None

Feature 56 Wall PRN 29267

SH 60182 31012

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, c.1m high. Irregular coursing. All coping stones lost.

Recommendations for further assessment: None
Recommendations for mitigatory measures: Reinstatement

Feature 57 Possible field boundary PRN 29268

SH 60206 30976 to SH 60182 30971 to SH 60162 30990

Period: Medieval?

Category: B Impact: None

Slight but consistent scarp, about 0.2m high, apparently forming approximate right angled, but rounded, corner of an ancient field. Not on pipe route

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 58 Wall PRN 29269

SH 60274 31020

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 0.8m high. Irregular coursing. Much reduced. All coping stones lost.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 59 Wall PRN29270

SH 60452 31045

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1.2m high. Irregular coursing. All coping stones lost.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 60 Ridge and furrow PRN 29271 (plate 8)

SH 60390 31050

Period: Post medieval

Category: C Impact: Slight

Narrow, straight ridge and furrow visible both on APs and on ground. Ridges 3m wide, no more than 0.1m high and parallel to NE boundary of field. Pipe trench will cut through the ridges just near the road, but easement will cause the loss of a 12m wide strip. Use of the road instead of creation of an easement should be considered. Record during strip, map and sample process.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Strip, map and sample.

Feature 61 Wall PRN 29272

SH 60480 31044

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, up to 1.5m high. Irregular coursing. All coping stones lost. Well preserved next to the road but tumbled down further north.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 62 Wall PRN 29273

SH 60691 30998

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 0.8m high. Irregular coursing. All coping stones lost. Collapsing.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 63 Sheep wash PRN 29274

SH 60728 31040

Period: Post medieval

Category: C Impact: None

Channel built, measuring 12m by 4m, with neat drystone walls, broad steps to allow access and concrete dam. Dam is inscribed 30-5-67, but it could be a later improvement. The character of the rest of the structure looks older but it is probably early 20th century. It is not on the County Series maps.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 64 Wall PRN 29275

SH 61100 30850

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1.3m high. Irregular coursing. Some coping stones survive. Entrance leading to track

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 65 Wandering wall PRN 29276

SH 61100 30800 to SH 61120 30740

Period: Medieval?

Category: C Impact: None

Wall well preserved at N end but very tumbled down in places. It survives up to 1.25m in height were well preserved, but much of it is hardly visible. The wall wanders as it follows contours of convoluted craggy ground. Not shown on any maps.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 66 Trackway PRN 5957

SH 61117 30833

Period: Post medieval

Category: D Impact: Slight

Track to Ffridd Llwyn Gwerfyl (Ffridd Farm). Unmade track with some hard core. Shown on 1889 map but no evidence on tithe map for access from this direction. Record during strip, map and sample process.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Strip, map and sample*

Feature 67 Wall PRN 29277

SH 61220 30830

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1.5m high. Irregular coursing. Some coping stones survive. There is an odd structure in the wall just S of the pipe route.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 68 Wandering wall PRN 29278

SH 61193 30764

Period: Medieval?

Category: C Impact: None

Slabs used to create revetment wall, up to 1m high, along natural edge. Follows contours so wanders irregularly. Tumbled, in bad state of repair except where rebuilt as wall 67 at north end. Continues round to PRN 5948. Shown on 1889 map but seems not to have been in use when tithe map was drawn up and possibly much older.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 69 Wall PRN 29279

SH 61240 30830

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1m high. Irregular coursing. Entrance gap. Coping stones lost.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 70 Wall PRN 29280

SH 61270 30840

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1m high. Irregular coursing. Entrance gap. Coping stones lost.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 71 Small house with barn PRN 5958

SH 61299 30755

Period: Post medieval

Category: C Impact: None

Small farmstead with small cottage, enclosure and barn. All surviving well. Aerial photograph 71/237 frame 247 taken in 1971 shows the roof still on this cottage. Shown on 1889 map and probably the buildings represented on tithe map. This site is currently recorded on the HER as 3 sheepfolds, but it is clearly more complex.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 72 Manganese mine PRN 1791

SH 61362 30785

Period: Post medieval

Category: C Impact: None

Nothing was seen at the grid reference given for PRN 21791, but at the grid reference listed here there is a spoil heap of broken waste stone revetted on W side. To the E of this is a gorge that did not show obvious signs of working but may be the source of the manganese. The PRN description mentions a pit but none was recognised.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 73 Wall PRN 29281

SH 61370 30820

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1m high. Irregular coursing. Coping stones lost. Collapse has caused a gap

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 74 Building PRN 29282

SH 61453 30865

Period: Post medieval

Category: C Impact: None

Building at start of track to Rhyd-yr-Eirin. S gable survives to nearly 2m high, and W wall is about 1m high, but the rest is demolished. There are the remains of a rectangular enclosure to the north. Shown on tithe map.

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Avoid*

Feature 75 Wall PRN 29283

SH 61440 30810

Period: Post medieval

Category: D Impact: Slight

Dry stone field wall, 1m high. Irregular coursing. More of a revetment than a wall

Recommendations for further assessment: *None*

Recommendations for mitigatory measures: *Reinstatement*

Feature 76 Wall PRN 29284

SH 61650 30790

Period: Post medieval

Category: D Impact: None

Dry stone field wall. Irregular coursing. More of a revetment than a wall, rather dilapidated, and up to 1m high. On tithe map. Unlikely to be impacted by pipe

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 77 Sheepfold PRN 5971

SH 61688 30814

Period: Post medieval

Category: D Impact: None

Small rectangular sheepfold with entrances in NE and SW walls. It measures 10m by 9m with walls 1m high. Shown on 1889 map.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 78 Barn PRN 5967

SH 61749 30895

Period: Post medieval

Category: C Impact: None

Well preserved drystone barn with tin roof and remains of an enclosure to E. It measures 6.6m by 6m and the gable wall is about 3.5m high. This barn is shown on 1889 map.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 79 Trackway PRN 29285

SH 61752 30934

Period: Post medieval

Category: C Impact: Slight

Track, about 4m wide, terraced into hill slope but no traces of a revetment. On 1889 map, not shown on tithe map but route must have been used to access buildings (feature 80). Current route shows pipe trench running just uphill of the track. If the track is to be damaged a watching brief will be required.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Watching brief

Feature 80 Building (site of) PRN 29286

SH 61784 30997

Period: Post medieval

Category: C Impact: Slight

Building shown on tithe map at this location but area is overgrown with marsh plants and no foundations can be seen. The site will probably be avoided by the pipe trench but a watch should be kept for any evidence if vegetation is cleared.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Watching brief

Feature 81 Trackway PRN 29287

SH 61389 30758

Period: Post medieval

Category: D Impact: Slight

Terraced path running below rock outcrop. Runs SW-NE and it is revetted by boulders. It is marked as a footpath on the 1889 map and the tithe map suggests it was in use in 1840 although it does not explicitly show the path. The path continues to be crossed by the pipe line but it is not a built structure at this point. Built section to be avoided.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid built section

Feature 82 Enclosure walls PRN 5940

SH 60776 30971

Period: Medieval?

Category: B Impact: None

The corner of a rectangular enclosure is visible on APs and on the ground the walls are denuded lines of boulders. A possible, but not very convincing, hut platform was seen near the road but the long hut marked as

PRN 5940 was not found despite extensive searching.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 83 Hut circle settlement PRN 5214 SAM number Me166

SH 63014 31990

Period: Prehistoric

Category: A **Impact:** None

Settlement composed of 6, possibly 7, round huts marked by clear hut platforms and stone walls. Recorded previously by GAT and not inspected in detail on this visit. The edge of the scheduled area is only c.35m from the pipe route. The scheduled area should be located and fenced off so that it is not accidentally entered.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Fence and avoid

Feature 84 Clearance cairn PRN 29288 (plate 9)

SH 60025 31018

Period: Prehistoric?

Category: C **Impact:** Slight

Small sub-circular cairn, about 3m in diameter and 0.5m high, with stones heaped against a natural boulder. Well overgrown with grass so appears ancient. The cairn is fairly well defined but is probably field clearance rather than burial. No other features nearby except a possible slight line of stones near the fence. This is not definitely a wall but should be inspected closely when the pipe route is stripped. If vehicles use the road and only the pipe route itself is stripped along this section damage to the cairn could be avoided.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Fence and avoid

Feature 85 Field boundary? PRN 29289

SH 60063 31000 to SH 60117 31028 to SH 60142 31012

Period: Prehistoric? Medieval?

Category: B **Impact:** Moderate

Rather irregular but continuous scarp, about 0.2m high, possibly defining the edge of an ancient field. Stones visible in scarp. Joins with scarp of feature 57. Stripping the full width of the easement should be avoided here. The boundary should be excavated and recorded during strip, map and sample process.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Strip, map and sample

Feature 86 Trackway PRN 29290

SH 59978 31020 to SH 61730 30890

Period: Post medieval

Category: C **Impact:** Slight

The road to Cwm Bychan is shown on the tithe map as tracks coming from the west and the south-east. These generally follow the present line but do not join in the middle. However, paths must have joined them along roughly the present line to allow access to farms and other buildings. At the western end, where it joins the Talsarnau road the track originally ran straight and kept to the south of the stream, whereas now it curves to the north-west. No trace of the earlier route could be seen in the fields.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Watching brief where pipe trench crosses the road.

Feature 87 Wall PRN 29316

SH 59988 31027

Period: Post medieval

Importance: D **Impact:** Slight

Drystone wall, c.1m high, along road side. Irregular coursing of rounded boulders. No coping stones.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 88 Wall PRN 29317

SH 59981 31030

Period: Post medieval

Importance: D **Impact:** Slight

Drystone wall, c.1.5m high, along road side. Irregular coursing of rounded boulders. No coping stones.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 89 Field clearance cairn PRN 29318

SH 59949 31040

Period: Unknown

Importance: D **Impact:** None

Rough heap of stones, forming a field clearance cairn, c.5m in diameter and 0.5m high. The lower stones are well embedded in grass and moss but the upper stones could have been deposited more recently. Some distance from pipe route, should be easily avoided

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 90 Trackway PRN 29319

SH 59948 31016

Period: Post medieval

Importance: D **Impact:** Slight

Track with hard core surface. The track leads to Foel and is not shown on the tithe map, although the farm is. The 1st edition OS map shows it on the same route as today. Recorded during strip, map and sample process.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Strip, map and sample

Feature 91 Wall PRN 29320

SH 59907 30992

Period: Post medieval

Importance: D **Impact:** Slight

Well built drystone wall, c.1.5m high. Irregular coursing of rounded boulders. No coping stones.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 92 Field clearance cairn PRN 29321

SH 59814 30961

Period: Unknown

Importance: D **Impact:** Slight

Low, rather irregular heap of stones very overgrown by grass and gorse, c.6m in diameter and 0.2m high. Field clearance cairn, but possibly of some antiquity. Far enough from the pipe route to be avoided

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 93 Hollow PRN 29322

SH 59822 30949

Period: Unknown

Importance: E **Impact:** Considerable

Small irregular hollow, measuring c.7m by 4m, with fairly steep western side. Up to 1m deep with rushes in base. Some stones are visible around the edge. Will be disturbed by pipe trench. Investigate during strip, map and sample process

Recommendations for further assessment: None

Recommendations for mitigatory measures: Strip, map and sample

Feature 94 Hollow PRN 29323

SH 59822 30903

Period: Post medieval?

Importance: D **Impact:** Considerable

Shallow, semi-circular hollow next to the road. It measures 10m by 3m and is about 0.5m deep. There are several hollows by the road but this is the deepest and most sharply defined. Base of hollow is fairly flat and sides are quite steep with some stones visible. It is not clear whether this is a natural hollow or possibly part of a borrow pit for building an earlier phase of the road.

Will be disturbed by pipe trench. Investigate during strip, map and sample process

Recommendations for further assessment: None

Recommendations for mitigatory measures: Strip, map and sample

Feature 95 Wall PRN 29324

SH 59690 30880

Period: Post medieval

Importance: D **Impact:** Slight

Corner of drystone wall. It was about 1.5m high but largely collapsed at the corner. Rough coursing with rounded boulders. A short section previous ran from the corner to the road edge but this is now only present as overgrown foundations. This section of wall will have to be extensively dismantled. The wall is to be reinstated to its present condition, i.e. the tumbled section is not to be rebuilt and tumbled stones are to be left as a valuable habitat.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Reinstatement

Feature 96 Disturbed ground PRN 29325

SH 59580 30832

Period: Unknown

Importance: E **Impact:** None

Area of disturbed ground, c.12m in diameter, seen as slight hollows and heaps of stone. Some heaps of small sub-rounded stones, but apparently not burnt stone. Some larger stones form rough lines but no real pattern can be discerned. May be the result of extracting stone for wall building or may be related to feature 48 across the road. This feature should be avoided

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoid

Feature 97 Road from Rhiwgoch to Talsarnau PRN 29326

SH 59599 30830

Period: prehistoric-post medieval

Importance: B **Impact:** Slight

Tarmaced road bounded by fences along much of its length but by walls in parts. The road is shown on the tithe map but also forms part of the proposed ancient route along Y Fonllech Hir. The standing stones and cairns marking this route suggest it could have Bronze Age originals. The pipe trench will cross this road at two points in a narrow trench.

Recommendations for further assessment: None

Recommendations for mitigatory measures: Watching brief on trench

5. SUMMARY OF ARCHAEOLOGICAL POTENTIAL

5.1 Summary of features identified

The features listed above cover a wide time period from the Bronze Age through to the nineteenth century. Many of the features are nineteenth century field walls and other late features of minor importance, but sheep folds and peat stacks fill out the details of rural life in this period and enable the complete functioning of the landscape to be understood.

There is plentiful evidence within this part of Arduwy for prehistoric and medieval settlement and associated relict field systems of walls and earthworks. Together these make an ancient landscape of exceptional importance, providing comparisons for more fragmentary sites elsewhere and allowing a more complete understanding of economic and social issues of the relevant periods. Individual hut circles and long huts form a critical part of this landscape, each with their store of preserved data that can contribute to the better understanding of the whole.

Despite the importance of this landscape there has been relatively little work on buildings or boundaries so direct evidence for dating and sequence of development is sparse. Many of the later walls follow the footprints of earlier boundaries and in some cases, incorporate earlier fabric. Some walls, currently still in use and of a 19th century character, may therefore preserve parts of the layout of earlier field systems and possibly buried remains beneath them.

Prehistoric sites are rarer than those of later periods but of great importance. The Garreg standing stone had a particular importance as one of seven stones marking a probable trackway. Such early tracks are proposed in various parts of Britain but few are as well defined as this section along Y Fonllech Hir. The Bronze Age burial monuments are of regional and national importance. Many of them have a particular local character, the upright kerb stones being particularly distinctive. Secondary burials can occur in and around a burial monument and there is always the potential for the presence of prehistoric remains, such as graves, which have no above ground indications.

5.2 Aerial Photographs

Vertical and oblique aerial photographs, including colour slides, dating from 1946 to 2000 were examined at the NMR in Aberystwyth. These provide a good over view of the area and are particularly useful for identifying ancient field boundaries and other linear features. Some also had clear images of smaller features such as roundhouses. On the 1971 photographs the original pipe route was still clearly visible through the uplands, although the pipe had been laid in 1968. The 1946 photographs were of poor quality and of limited use but those taken in 1958 had very good low-angled lighting and even small features could be clearly identified. Most of the oblique photographs were of specific known sites but some showed other features as well. The vertical photographs were the most useful in identifying potential new sites, which could sometimes be confirmed if they appeared on the edge of an oblique. Sites identified from the air photographs were checked on the ground during the field search.

5.3 Environmental Remains and Soil Morphology

The peats of the uplands have a high potential for preserving a good pollen record, especially those in small bogs near farmsteads. However, the present works will not damage any peat bogs or effect the drainage regime of the area, so it will have no impact on this preserved record. Most of the area to be crossed by the open cut pipe trench seems to have fairly thin soils, mostly at least occasionally disturbed by ploughing. Relict soils might be preserved under later field walls, especially those that may have been in use since the medieval period. Where the strip, map and sample trench cuts through walls deposits under these should be inspected and recorded and sampled if appropriate.

The aim is to avoid features recognisable on the surface but buried features could be found containing charred plant remains or if made of stone possibly sealing a relict soil.

5.4 Artefactual Potential

The excavated sites of Moel Y Gerddi and Erw-wen were not rich in artefacts (Kelly 1988) and roundhouse settlements are typically fairly sparse in finds. The ring cairn excavated near Moel Goedog produced numerous cremation urns and food vessels and other such burial cairns may have similar artefacts (Lynch 1984). The current works aim to avoid known archaeology so few finds might be expected to be recovered, but stripping for the new pipe trench could reveal buried archaeology containing some artefacts.

6. RECOMMENDATIONS

6.1 The pipe bursting section

The upland section of the raw water pipe is to be replaced by pipe bursting. This involves breaking the original pipe and inserting the new one through the old pipe. Access to the pipe is needed at intervals but this is through already disturbed ground and ground works are kept to a minimum. The pipe bursting process causes some displacement of the ground but this is mostly upwards along the line of the pipe. An explanation of pipe bursting and a justification for its use in this case have been provided by Dŵr Cymru and this is included as appendix II.

The greatest threat to archaeological features along this stretch is from construction vehicles. It is intended that these will keep to the present pipe route but in places this will prove very difficult to travel along and some deviation is inevitable. Material and vehicles are to be stored in temporary compounds along the route. These have not yet been finally identified but various level areas were investigated during the field search as possible compound sites. The pipe route must be clearly marked and any diversions and the location of compounds must be agreed in discussion with the SNP archaeologist. Compounds must be fenced and the marking out of

the route and any diversions and the fencing of compounds should be monitored by an archaeologist to avoid damage to archaeological features.

Many of the features listed above are field walls crossed by the pipeline route. Sections through many of these will have to be dismantled to allow either the pipe trench through or to allow vehicle access, and in most cases these sections of wall have already been dismantled and rebuilt when the pipe was originally laid. Although some of these walls may follow the line of much earlier field boundaries most are nineteenth century in date and appear on the 1889 OS map. Many can also be recognised on the 1840 tithe map, and may originate in the eighteenth century, although those defining fields created by the 1836 enclosure award are clearly of a nineteenth century origin. The character of all these walls has been briefly recorded as part of this assessment and if they are rebuilt in their original style very little loss of information or change to the landscape character will have been caused. Reputable local stone masons should be contracted from the dismantling and rebuilding of these walls. The walls must be reinstated to their pre-impact condition, so that tumbled walls are not rebuilt but left tumbled and the stones are left to form a valuable wild life habitat.

In the case of features 23 and 36 a substantial length of the wall may have to be removed and for these basic recording of the whole length to be demolished is recommended. Wall feature 21 resembles the others in its drystone work but follows a more irregular and wandering route than most. It is likely that this wall follows the line of an earlier, possibly medieval wall. It is recommended in this case that when the wall section is demolished a small evaluation trench be dug to investigate the deposits below the wall and, if appropriate, samples of buried deposits be taken for further analysis.

Many of the sites are far enough from the pipe route that they are at no risk from the works as long as the route is unchanged and vehicles stay close to the route. Several sites (features 2, 4, 6, 12, 15, 18, 24, 34 and 35) are close enough to the route that they should be fenced off so that they are easily visible and are not driven over by vehicles. Particular care should be taken where temporary compounds are set up. A particularly sensitive area is the hill slope on which cairn field (feature 15) and clearance cairns (feature 12) are located. This is a fairly open area where the pipe route can be easily lost. The route should be well marked in this area and vehicles should keep strictly to the route. Site 35 is a scheduled ancient monument and it is an offence to damage it. This is only 8m from the pipe line and must be clearly fenced. Feature 83 is also a scheduled ancient monument. It is some distance from the pipe line but it is on level ground, which may be needed for vehicle manoeuvring or storage. This scheduled area is fairly large and poorly defined on the ground and should be fenced off to prevent accidental access.

Features 2 and 34 lie exactly along the pipe route. It is assumed that the pipe bursting process will cause minimal direct damage to these sites as long as access to the pipe to insert pipe bursting equipment is well away from the sites. Both sites are partially truncated by the existing pipe trench and any lateral movement during pipe bursting could potentially cause some disturbance of the archaeology. They are, however, particularly vulnerable to damage from vehicles. In most areas it is important that vehicles keep as close as possible to the pipe route but where there are features on the route they will have to avoid them. Again, fencing the sites clearly is important.

Along the whole of the upland section fencing should be guided or checked by an archaeologist and the works will require monitoring to ensure that no problems arise that could result in damage to the archaeology. All points where the ground is disturbed to allow access to the pipe to insert pipe bursting equipment should be subject to an archaeological watching brief to ensure no accidental damage is caused.

6.2 The new pipe trench

In the lowland section the pipe is to be replaced in a new trench dug along a slightly different line to the existing pipe. An easement 12m wide will be stripped of topsoil to allow the dumping of spoil and for vehicular access. This easement will be temporarily fenced off and no vehicles will be allowed outside the easement. As with the upland section some walls will have to be dismantled and rebuilt to allow access. This work must also be done by a reputable local stone mason and the walls must be reinstated to their present condition, and not fully rebuilt if at present tumbled.

Along most of the route the topsoil appears to be very thin and this stripping will need a continuous watching brief in case any buried archaeology is present. Where the soil is too thin for vehicles to run on without causing rutting in the natural deposits below all the topsoil should be stripped and the natural inspected for archaeological features. Any features identified should be evaluated and if necessary fully excavated. This

means that along parts of the route the watching brief would have to be converted to a full strip, map and sample methodology.

Where the soil is deep enough to allow vehicles to run on it without causing damage a 1.8m band along the line of the pipe trench should be stripped down to the natural deposits and inspected for archaeological features according to strip, map and sample techniques. This could lead to the identification of archaeological features or deposits that require full excavation. Where it is possible for vehicles to dig the pipe trench from the road, especially along the fields between features 60 and 84, it is recommended that only the 1.8m wide strip for the pipe is carried out and no easement stripping is undertaken. This will minimise damage to the ridge and furrow and possible ancient field boundaries in this area. During the strip, map and sample process attention should be paid to deposits sealed beneath walls, which may need recording and sampling. If interesting features within the walls are threatened they should be recorded before being demolished.

The route of the pipe trench as presented in this report is designed to avoid all known archaeology. Near the water works the route originally proposed ran between the long hut (feature 39) and a field wall, allowing insufficient room for works with seriously risking damage to the long hut. The alternative route proposed here runs between features 38 and 39 and the whole width of the easement should be stripped to natural sub-soil and examined (see figure 8). Care should be taken to ensure that no damage is caused to either feature 38 or 39. In this case and in the case of other features close to the pipe route care should be taken to ensure no damage is caused by vehicles during fencing off the easement. Any features falling within the easement will have to be excavated during the strip, map and sample procedure.

6.3 Summary of recommendations

The upland section of the pipe route will require careful fencing with archaeological advice to prevent vehicle damage to sites. All groundworks to gain access to the pipe to insert pipe bursting equipment should be subject to a watching brief. The route of the new pipe trench is to be subject to a watching brief on the topsoil stripping of the easement and strip, map and sample methodology on a strip 1.8m wide on the route of the pipe trench itself. If the topsoil is too thin to allow vehicles to run on it without risking damage to the archaeology then the whole easement should be inspected by strip, map and sample. This will allow any features crossed by the trench to be inspected and if necessary fully excavated. All walls demolished should be reinstated in the original style. In addition specific mitigation is required on the following features:-

Mitigation method	Features included
Evaluation trench	21
Basic recording	23, 36
Watching brief	79, 80, 86, 97

7. CONCLUSIONS

As long as vehicle access is carefully managed the upland pipe bursting works should have minimal impact on the archaeology. Clear fencing and definition of the pipe route will be important to prevent accidental damage. The pipe trench in the lowland section is to be designed to avoid known archaeology. A strip and map programme on the route of the pipe trench will identify any buried archaeology and allow for its excavation and recording.

8. ARCHIVE

The archive consists of copies of historic maps, plans with annotations made in the field and transcribed from aerial photographs, along with notes and 330 digital images taken on the field visit. The sites are recorded in a database to aid their input to the HER and any relevant National Park database.

Three copies of the bound report will be sent to the SNPA archaeologist, and a further copy sent to the HER Archaeologist at the curatorial division of Gwynedd Archaeological Trust, Bangor, for deposition in the Regional HER. A copy of the report will be provided to the National Monument Record, Royal Commission on the Ancient and Historic Monuments of Wales, Aberystwyth.

9. REFERENCES AND OTHER SOURCES CONSULTED

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GAT Historic Environment Record

Ordnance Survey 25 inch First Edition County Series maps Merionethshire sheets IXX.13, 14, 15 and XXVI.1 and 2 (1889)

National Library of Wales, Aberystwyth

Cors y Gedol Estate Sale Catalogues 1849 (none of the lands within the study area were included in the sale)

Bangor University Archives

Mostyn MSS 8604: Map and Survey of the Parishes of Llandanwg and Llanfihangel y Traethau in the County of Merioneth 1810

Mostyn MSS 8606: Map and survey of Sir T Mostyn Bart's allotments of common in the parish of Llanfair in the County of Merioneth 1815

Merioneth Record Office, Dolgellau

Tithe map for the parish of Llanfair in Merionethshire 1840.

Tithe Apportionment Schedule for the parish of Llanfair in Merionethshire 1839.

Tithe map for the parishes of Llanfihangel y Traethau and Llandecwyn in the County of Merioneth 1842.

Tithe Apportionment Schedule for the parishes of Llanfihangel y Traethau and Llandecwyn in the County of Merioneth 1842.

Z/M/689/10: John Speed's Map of Merionethshire 1610

Z/DBJ/1159: copy of a letter from the landowner of Ffynnon Fair allowing the use of his spring to provide water for the village. This spring is closer to Llanfair village and is not related to the present water works

QR/En/5: Enclosure award for the parishes of Llanbedr and Llanfair 1836 (no map surviving)

Llanfair Women's Institute, 1999, Llanfair is my dwelling place (local history booklet with photographs of farmhouses in the study area and anecdotes about their occupants)

RCAHMW, Aberystwyth

Aerial Photographs

Verticals

OS 71-210, date 12th May 1971, frame 57

OS 71-234, date 21st May 1971, frames 180, 181, 211, 212, 246, 247, 276, 277, 308-10

OS 71-286, date 4th June 1971, frames 89, 90

106G/UK/1455, date 2nd May 1946, frames 4309-11

58/RAF/2649, date 5th December 1958, frames 116, 117

540/464, date 20th April 1951, frames 4010-4015

Obliques

003505, frames 26, 27 (PRNs 1050 and 1066)

003505, frame 28 (PRNs 1055 and 1066)

003505, frame 29 (PRN 2903)

2002/5006-6 (PRN 1053)

2002/5007-43 (Gerddi Bluog)

202/5007-44 (PRN 1004)

Colour slides

All dated 30th March 2000

2000-CS-0252 (Quarries by Llyn Eiddew Mawr)

2000-CS-0257 (Llyn Eiddew Mawr from west)

2000-CS-0265 (Landscape near Maesyraelfor)

2000-CS-0281 (Gerddi Bluog)

2000-CS-0282/3 (Ffridd Farm)

APPENDIX I: Previously known sites along and around the route of the raw water pipe

Table 1: Sites on or very close to the pipe route

PRN	NPRN	Site name	SAM or listed building grade	Site type	Period	Form	Description	Eastin g	Northi ng
1049	55199	Fonllech Hir standing stone	M057b	Standing stone	Bronze Age	Standing monument	Stone slab. 'Carreg' a tapering column 1.8m high 0.6m x 0.3m at base. One of a series marking an ancient trackway. Erosion around base exposed no at stones. Cairn 1153 lies 17m to east.	259880	330960
1153	55208	Garreg round cairn	M107	Cairn	Bronze Age	Stone built feature	Cairn. Roughly 0.5m - 0.75m high mound of stones (15 - 16m across) generally covered with gorse and turf. Despite the addition of clearance material on to the site during recent times, enough remains to suspect that this feature could represent a Bronze Age cairn about 15m across.	259900	330950
1176	57426	Hut circle\hut group, SE of Moel y Glo		Hut circle settlement	Prehistoric	Stone built feature	At least two possibly three hut circles in a rough line W - E on sloping ground SW of Llyn Eiddew Mawr.	263700	333250
5212	60223	Cairn, NE of Moel y Gerddi	M208	Cairn	Bronze Age	Earthwork	The Fridd Fron kerb cairn is a well-preserved and largely intact. It is 4.5m in diameter and stands 0.5m high. Along its north western edge, the heap of stones making up the body of the cairn is held in place by a kerb of 6 upright slabs of stone about 0.6m in height. In the centre of the cairn are the remains of a stone box or 'cist'.	263130	332380
5213	60224	Platform house, NE of Moel y Gerddi		Platform house	Medieval?	Earthwork		263050	332150
5214	60225	Hut group & field system, NE of Moel y Gerddi	M166	Hut circle settlement	Roman/IA	Stone built feature	This compact, unenclosed settlement consists of a group of at least 5, possibly 7 round huts, with a contemporary field system marked by lengths of curvilinear walls.	263000	331950
5931	63969	Rectangular structure & enclosure		Enclosure	Unknown	AP site	Enclosure, building	261940	331040
5932	63970	Enclosures and walls		Enclosure	Unknown	AP site	Enclosure	262010	331050
5940	63978	Poss long hut/enclosure		Long hut, enclosure	Medieval?	AP site	Hut - rectangular, enclosure	260780	330960
5952	63989	Sub-rectangular enclosure		Enclosure	Unknown	AP site	Enclosure	261500	330980
5957	63993	Trackway		Trackway	Unknown	AP site	Trackway	261100	330800
5965	64002	Irregular enclosure		Enclosure	Unknown	AP site	Enclosure	261730	330960
5966	64003	Concentric sub-circular enclosure		Enclosure	Prehistoric	AP site	Enclosure	261660	330880
5967	64004	Farm building and enclosure		Building, enclosure	Post-Medieval	AP site	Building, enclosure	261750	330890
5971	64008	Sub-rectangular enclosure/fold		Enclosure	Post-Medieval	AP site	Enclosure	261680	330810

PRN	NPRN	Site name	SAM or listed building grade	Site type	Period	Form	Description	Eastin g	Northi ng
5976	64013	Field system		Field system	Unknown	AP site	Enclosure, wall	261700	330800
6160	60975	Settlement, Cwm Mawr		Settlement	Prehistoric	Stone built feature	Enclosure, hut - circular	263600	332950
6162	60976	Hut circle under peat stack, Cwm Mawr		Hut circle	Prehistoric	Other structure	Hut - circular, mound	263900	333350
11771	40009	Gerddi Bluog mill	GII	Chaff mill	Post-Medieval	Documentary	Building. Water-powered dairy and chaff-cutting mill. Wheel removed.	261910	330840
12352	28363	Drws yr Ymlid	GII	Building	Post-Medieval		Building.	259720	330480
20612		Long hut		Long hut	Medieval	Earthwork	Rectangular structure with AP evidence for adjacent small enclosure. Surveyed in detail by GAT.	259240	330420
20613		Possible burnt mound		Burnt mound?	Prehistoric	Earthwork	Site identified in previous phases of assessment and evaluation and currently undergoing excavation.	25925	33031
21791	0	Ffridd Llwyn Gurfal mine		Manganese mine	Post-Medieval	Earthwork	Pit, mound	261400	330800

Table 2. Sites within about 500m of the pipe route

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
1001	56799	Hut group - enclosed, SE of Moel Goedog	Domestic	M134	Hut group	Roman/IA				
1002	56800	Hut group + field system, SE of Moel Goedog	Domestic	M133	Hut group	Roman/IA				
1003	56801	Hut circle - near Moel Gerddi								
1004	56109	Enclosed hut circle-probably I/A, nr Moel y Gerddi	Domestic		Hut circle	Roman/IA	Stone built feature	Hut - circular	261370	331170
1005	56802	Wandering walls - near Moel Gerddi								
1006	56803	Cairn\clearance cairn?, nr Moel y Gerddi								
1007	56804	Ring cairn Bedd Gurfal	Religious, Ritual and Funerary	M135	Cairn	Bronze Age	Stone built feature	Stone group	261290	331130
1038	56827	Fonllech Hir standing stone (1)	Religious, Ritual and Funerary	M057a	Standing stone	Bronze Age	Standing monument		260140	331300

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
1045	57357	Hut circle, nr Gerddi Bluog	Domestic	M165	Hut circle	Roman/IA	Stone built feature	Hut - circular	262180	330570
1046	57358	Field system, nr Tyddyn y Gwynt	Agriculture and Subsistence		Field system	Unknown	Recorded	Strip field, ridge & furrow	260100	330600
1047	56807	Hut circle + wandering walls, nr Fonllef Hir	Domestic		Hut circle	Prehistoric	Stone built feature	Hut - circular	261120	330940
1048	55198	Site of standing stone nr Tyddyn y Felin	Religious, Ritual and Funerary		Standing stone	Bronze Age	Recorded	Stone slab. Removed in 1970s	259480	330470
?		Possible standing stone identified by Kelly	Religious, Ritual and Funerary		Standing stone	Bronze Age?	Standing monument	Stone slab	259060	330120
1050	55200	Hut group + field system, W of Clogwyn Caseg-wen	Domestic		Hut settlement	Medieval?	Stone built feature	Huts, strip field, ridge & furrow. Kelly claims these are long huts not circular	259200	330100
1052	55202	Hut circle + field system, nr Tyddyn y Felin	Domestic		Hut circle	Early-Medieval	Stone built feature	Hut - circular, enclosure, wall	259410	330880
1053	55203	Cefnfilltir hut group (enclosed)	Domestic	M098	Hut circle settlement	Roman/IA	Stone built feature	Huts - circular, enclosure	259020	330800
1054/5	55204/5	Muriau'r Gwyddelod settlement & field systems	Domestic	M010	Hut circle settlement	Roman/IA	Stone built features	Huts - circular, enclosure, trackway	258200	330380
1066	57369	Circular enclosure, nr Hafod y Llyn	Agriculture and Subsistence		Enclosure	Roman/IA	Stone built feature	Circular enclosure	259180	329900
1151	57415	Hut and paddocks, Llyn Eiddew Bach	Domestic		Settlement	Medieval	Stone built features	Huts – rectangular and enclosures/paddocks	264450	334330
1174	57424	Hafoty settlement & other remains, SE of Moel y Glo	Domestic	M189	Settlement	Prehistoric/medieval	Stone built feature	Rectangular hut over earlier walls, no circular hut visible but probably under the rect one	263170	333470
1175	57425	Cairn?, SE of Moel y Glo	Religious, Ritual and Funerary		Cairn	Bronze Age?	Stone built feature	Cairn, cist?	263220	333200
1181	57428	Settlement site, Moel y Gerddi	Domestic		Settlement	Medieval?	Stone built feature	Building-rectangular	261850	331740
1182	57429	Hafoty settlement, Moel y Gerddi	Domestic		Settlement	Medieval?	Stone built feature	Huts - rectangular, enclosure. No evidence of circular huts	262270	331900
2901	55259	Y Ffordd Wyddelig (near Muriau Gwyddelod), Harlech	Transport		Trackway	Prehistoric	AP site	Trackway, presumably related to the settlement	259020	330350
2902	55260	Sub - rectangular enclosure near Muriau Gwyddelod	Agriculture and Subsistence		Enclosure	Unknown	Stone built feature	Enclosure-subrectangular	258970	330240
2956	56915	U-enclosure, hut + cairn, Cwm Mawr	Domestic		Hut circle	Prehistoric	Stone built feature	Enclosure, hut, cairn	263850	333520
2960	57845	Gerddi Bluog house (C16AD + later)	Domestic	GII	House	Post-Medieval	Building - roofed	Building	261940	330850
4298	58056	Cairn - Cae'r Garnedd - Foel	Religious, Ritual and		Cairn	Prehistoric	Stone built	Cairn, stone heap	259650	331380

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
			Funerary				feature			
5178	58877	Cairn, NW of Cwm Mawr	Religious, Ritual and Funerary		Cairn	Prehistoric	Stone built feature		263200	332140
5900	63940	Cairn	Religious, Ritual and Funerary		Cairn	Prehistoric	AP site	Cairn, enclosure	262000	331770
5901	63994	Rectangular building	Domestic		Building	Post-Medieval	AP site	Building	261250	330540
5902	64019	Enclosure/strip fields	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	261900	330690
5905	63943	Enclosure/walls, Moel y Gerddi	Agriculture and Subsistence		Wall	Prehistoric	AP site	Walls, enclosure	261000	331000
5906	63944	Cultivation terraces/lynchets, Moel y Gerddi	Agriculture and Subsistence		Cultivation terrace	Unknown	AP site	Enclosure, ridge and furrow	261640	331600
5908	63946	Trackway	Transport		Trackway	Unknown	AP site	Trackway, holloway	261910	331430
5909	63947	Sheepfold	Agriculture and Subsistence		Sheepfold	Post-Medieval	AP site	Enclosure	261980	331320
5910	63948	Enclosure/walls	Agriculture and Subsistence		Enclosure, wall	Post-Medieval	AP site	Enclosure, wall	261960	331330
5911	63949	Enclosure and banks	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure, bank	261900	331300
5912	63950	Sheepfold	Agriculture and Subsistence		Sheepfold	Post-Medieval	AP site	Enclosure	261790	331280
5913	63951	Rectangular building and enclosure	Domestic		Building	Post-Medieval	AP site	Building, enclosure	261960	331260
5914	63952	Enclosure	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	261980	331210
5915	63953	Rectangular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261980	331180
5916	63954	2 enclosures	Unassigned		Enclosure	Unknown	AP site	Enclosure	261870	331250
5917	63955	Wandering walls	Agriculture and Subsistence		Wall	Prehistoric?	AP site	Wall	261800	331170
5918	63956	Sub-circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261340	331200
5919	63957	Hut circle and enclosure	Domestic		Hut circle	Prehistoric	AP site	Hut - circular, enclosure	261390	331160
5920	63958	Wall and terraced fields	Agriculture and Subsistence		Field system	Prehistoric	AP site	Enclosure, terrace	261410	331180
5921	63959	Sub-rectangular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261480	331240
5922	63960	Sub-oval enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261520	331310
5923	63961	Farm buildings and enclosure	Agriculture and Subsistence		Farm	Post-Medieval	AP site	Building, enclosure	261600	331280
5924	63962	Hafod and enclosure	Agriculture and Subsistence		Hafod	Post-Medieval	AP site	Building, enclosure	261600	331040
5925	63963	Hut circle and enclosure	Domestic		Hut circle	Prehistoric	AP site	Hut - circular, enclosure	261760	331200

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
5927	63965	Enclosures/banks	Unassigned		Enclosure	Unknown	AP site	Enclosure, bank	261750	331060
5928	63966	Sub-circular & rectangular enclosures	Unassigned		Enclosure	Unknown	AP site	Enclosure	261860	331100
5929	63967	Enclosure/fold	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	262000	331150
5930	63968	Rectangular enclosure	Agriculture and Subsistence		Enclosure	Post-Medieval	AP site	Enclosure	261920	331150
5933	63971	Area of cultivation ridges	Agriculture and Subsistence		Cultivation terrace	Unknown	AP site	Field system	261660	331150
5934	63972	Cairn/mound	Religious, Ritual and Funerary		Cairn, mound	Prehistoric	AP site	Cairn, mound	260700	331090
5935	63973	Cairn/mound	Religious, Ritual and Funerary		Cairn, mound	Prehistoric	AP site	Cairn, mound	260740	331110
5936	63974	Rectangular building	Domestic		Building	Post-Medieval	AP site	Building, hut - rectangular, enclosure	260780	331110
5937	63975	Hut circle/enclosure	Unassigned		Hut circle, enclosure	Prehistoric	AP site	Hut - circular, enclosure	260740	331110
5938	63976	Cairn/mound	Religious, Ritual and Funerary		Cairn, mound	Prehistoric	AP site	Cairn, mound	260780	331060
5941	63979	Circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure, hut - circular	260620	330890
5942	63980	Circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure, hut - circular	260620	330850
5943	63981	Burnt mound	Domestic		Burnt mound	Prehistoric	AP site	Burnt mound	260690	330860
5944	63982	Cairn/mound	Religious, Ritual and Funerary		Cairn, mound	Prehistoric	AP site	Cairn, mound	260650	330590
5945	63983	Circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	260650	330580
5946	63984	Banks/walls	Unassigned		Bank, wall	Unknown	AP site	Banks, walls	260690	330500
5948	63986	Poss. Long hut and wall	Domestic		Long hut, enclosure	Medieval	AP site	Hut - rectangular, enclosure	261000	330810
5949	63987	Poss. Hut circle	Domestic		Hut circle, enclosure	Prehistoric	AP site	Hut - circular, enclosure	261200	330910
5950	63988	Terrace	Agriculture and Subsistence		Terrace	Prehistoric	AP site	Field system	261150	330910
5951	64023	Hut circle and enclosure	Domestic		Hut circle	Prehistoric	AP site	Hut - circular, enclosure	261960	330700
5953	63990	Farm buildings	Domestic		Building	Post-Medieval	AP site	Building	261160	330610
5954	63991	2 long huts/enclosures	Domestic; Agriculture and Subsistence		Long hut, enclosure	Medieval	AP site	Hut - rectangular, enclosure	261170	330610
5956	63992	Trackway	Transport		Trackway	Medieval	AP site	Trackway	261100	330500
5958	63995	Three sheepfolds	Agriculture and Subsistence		Sheepfold	Post-Medieval	AP site	Enclosure	261290	330750

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
5959	63996	Long hut	Domestic		Long hut	Medieval	AP site	Hut - rectangular	261320	330660
5960	63997	Cairn/mound	Religious, Ritual and Funerary		Cairn, mound	Prehistoric	AP site	Cairn, mound	261330	330650
5961	63998	Wandering wall	Agriculture and Subsistence		Wall	Prehistoric?	AP site	Wall	261310	330700
5962	63999	2 hut circles and enclosure	Domestic		Hut circle	Prehistoric	AP site	Hut - circular, enclosure	261380	330690
5963	64000	Hut circle	Domestic		Hut circle	Prehistoric	AP site	Hut - circular	261400	330730
5964	64001	Field system	Agriculture and Subsistence		Field system	Prehistoric	AP site	Enclosure, wall	261400	330700
5968	64005	Enclosure	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	261910	330950
5969	64006	Sub-rectangular enclosure	Agriculture and Subsistence		Enclosure	Post-Medieval	AP site	Enclosure	261650	330680
5970	64007	Enclosures	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	261630	330690
5972	64009	Sub-circular enclosure and bank	Unassigned		Enclosure	Unknown	AP site	Enclosure	261750	330690
5973	64010	Sub-rectangular hut platform	Domestic		Platform	Medieval	AP site	Platform	261720	330730
5974	64011	Circular enclosure	Unassigned		Enclosure	Prehistoric	AP site	Enclosure	261740	330760
5975	64012	Circular enclosure	Unassigned		Enclosure	Prehistoric	AP site	Enclosure	261780	330830
5977	64014	Poss. Rectangular hut/enclosure	Domestic		Enclosure	Medieval	AP site	Hut - rectangular, enclosure	261770	330810
5978	64015	Enclosure/sheepfold	Agriculture and Subsistence		Enclosure	Post-Medieval	AP site	Enclosure	261900	330870
5979	64016	Field system	Agriculture and Subsistence		Field system	Unknown	AP site	Enclosure, wall	261980	330940
5980	64017	Hut circle/ring cairn	Unassigned		Hut circle, ring cairn	Prehistoric	AP site	Hut - circular, cairn	262070	330930
5981	64018	Circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261840	330600
5982	64020	Rectangular enclosure	Unassigned		Enclosure	Post-Medieval	AP site	Enclosure	261880	330660
5983	64021	Large circular enclosure	Unassigned		Enclosure	Unknown	AP site	Enclosure	261910	330650
5984	64022	3 small enclosures/folds	Agriculture and Subsistence		Enclosure	Post-Medieval	AP site	Enclosure	261930	330640
5985	64024	Rectangular building/enclosure	Domestic		Building	Post-Medieval	AP site	Building, enclosure	261970	330670
5986	64025	Rectangular enclosure/fold and walling	Agriculture and Subsistence		Enclosure	Unknown	AP site	Enclosure	262020	330770
6120	64241	Hut circle, Cwm Mawr	Domestic		Hut circle	Prehistoric	Stone built feature	Hut - circular	263200	332040
6158	60978	Peat stacks, Nant y Steicyn	Industrial		Peat stack	Post-Medieval	Other structure	Mound	263300	333000
6159	60977	Burnt mound, Nant y Steicyn	Domestic		Burnt mound	Prehistoric	Other structure	Mound	263330	332950

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
6161	60979	Peat stack, Nant Steicyn	Industrial		Peat stack	Post-Medieval	Other structure	Mound	263800	333000
6163	60980	Peat stacks, Llyn y Fedw	Industrial		Peat stack	Post-Medieval	Other structure	Mound	262800	332900
6164	60974	Round hut/long hut Cwm Mawr c/d	Domestic		Hut	Unknown	Stone built feature	Hut	263400	332100
6165	60972	Rectangular hut, Cwm Mawr a	Domestic		Long hut	Post-Medieval	Stone built feature	Hut - rectangular	263100	331500
9862	0	Gwyddelfynydd medieval township	CIVIL		Township	Medieval	Documentary		261300	330380
9929	0	Platform hut, Cilbronrhydd	Domestic		Platform hut	Medieval	Stone built feature	Hut - rectangular	260800	330730
9930	0	Hut circle, Cilbronrhydd	Domestic		Hut circle	Prehistoric	Stone built feature	Hut - circular	260830	330750
10141	59721	Sheepfold on S shore of Llyn Eiddew-bach	Agriculture and Subsistence		Sheepfold	Post-Medieval	Stone built feature	Stone foundations-rectangular, building	264520	334140
10143	59723	Structure/shelter NE of Llyn Eiddew-mawr	Domestic		Building	Post-Medieval	Stone built feature	Building-sub-rectangular	264890	334070
10145	59725	Stone shelter NW of Llyn Eiddew-mawr	Domestic		Building	Modern	Stone built feature	Building	264670	334200
10146	59726	Enclosure & structure N of Llyn Eiddew-mawr	Agriculture and Subsistence		Enclosure	Post-Medieval	Stone built feature	Wall, building	264550	334210
10147	59727	Hut circle at N edge of Llyn Eiddew-mawr	Domestic		Hut circle	Prehistoric	Stone built feature	Stone foundations-circular	264560	334130
10148	59728	Building foundation NNE Llyn Eiddew-mawr	Domestic		Building	Medieval	Stone built feature	Stone foundations-rectangular	264550	334120
10149	59729	Mining remains NW Llyn Eiddew-mawr	Industrial		Mine	Post-Medieval	Stone built feature	Buildings	264480	334050
10150	59730	Peat mound NW of Llyn Eiddew-mawr	Industrial		Peat stack, mound	Post-Medieval	Other structure	Mound-sub-rectangular	264340	334250
10151	59731	Peat mounds WNW of Llyn Eiddew-mawr	Industrial		Peat stack, mound	Post-Medieval	Other structure	Mound-sub-rectangular	264070	334040
10152	59732	Sheepfold S of track to Llyn Eiddew-bach	Agriculture and Subsistence		Sheepfold	Post-Medieval	Stone built feature	Wall	264170	334230
10153	59733	Possible long hut NW of Llyn Eiddew-mawr	Domestic		Long hut	Medieval	Stone built feature		264200	334080
11846	41649	Drws yr Ymlid - barn	Agriculture and Subsistence	GII	Building	Post-Medieval		Building	259710	330520
11847	41650	Drws yr Ymlid - fowl house	Agriculture and Subsistence	GII	Building	Post-Medieval		Building	259700	330500
11848	41651	Drws yr Ymlid - pigsty/brewhse	Agriculture and Subsistence	GII	Building	Post-Medieval		Building	259700	330500
11852	41659	Gerddi Bluog (NE,SW)-out -	Agriculture and	GII	Building	Post-Medieval		Building	261940	330850

PRN	NPRN	Site name	Class	SAM or listed building grade	Site type	Period	Form	Description	Easting	Northing
		buildings	Subsistence							
11853	41662	Gerddi Bluog - dower house?	Agriculture and Subsistence	GII	Building	Post-Medieval		Building	261950	330860
11854	41663	Gerddi Bluog - pigsties/shed	Agriculture and Subsistence	GII	Building	Post-Medieval		Building	261930	330830
12898	0	Cairn, E of Llyn y Fedw	Religious, Ritual and Funerary		Cairn	Prehistoric	Stone built feature	Cairn	263200	333240
18259	0	Fieldscape and woods - landscape	Unassigned		Landscape	Multi-period		0	261780	330320
20643	60763	Manganese mine, Llyn Eiddew-mawr	Industrial		Manganese mine	Post-Medieval	Other structure	Pit, tunnel	264400	333900
20650	60764	Manganese mine, Cwm Mawr	Industrial		Manganese mine	Post-Medieval	Other structure	Pit, tunnel	263400	332300
21749	0	Cambrian mine	Industrial		Manganese mine	Post-Medieval	Earthwork	Pit, mound	263400	332200
21792	0	Ffridd Tyddyn Du mine	Industrial		Manganese mine	Post-Medieval	Earthwork	Pit, mound	263700	332800

Table 3: Listed buildings near the pipe route

PRN	Listing No.	Grade	Name	Eastings	Northings
4772	11734	II	Gerddi Bluog	261938	330856
4802	13801	II	Barn (1) at Gerddi Bluog	261923	330801
5251	10362	II	Drws yr Ymlid Farmhouse	259726	330483
5252	13025	II	Pigsty & Brewhouse at Drws yr Ymlid Farm (including rubble-walled yard between)	259751	330504
5253	11626	II	Fowl House at Drws yr Ymlid Farm (including rubble-walled yard)	259740	330507
5254	10610	II	Barn at Drws yr Ymlid Farm	259763	330516
81071	10565	II	Barn (2) at Gerddi Bluog	261922	330808
81072	10566	II	Barn (3) at Gerddi Bluog	261929	330781

81076	11480	II	Field Barn at Drws yr Ymlid	259684	330604
81077	11481	II	Field Barn at Gerddi Bluog	262117	331014
81079	11631	II	Fridd Farm	261235	330471

APPENDIX II: Description of and justification for pipe bursting from Dŵr Cymru Welsh Water

1. Introduction – Logic behind construction sequence

The pipe walls of the existing 6" Cast Iron raw water main has a large build up of manganese. Frequent shut downs to this raw water main will allow the manganese to drop off and clog the filters up at Rhiwgoch WTW. Rhiwgoch works does not have the capacity or capability to accept large amount of manganese. If this scenario was to happen, the people of Harlech and surrounding areas will be starved without water until the works it brought back into line.

To prevent these events from occurring, the proposed will be made up of two phases. Phase one – open cut & Phase two – pipe bursting.

By open cutting approximately 2.6km from Rhiwgoch treatment works to the start of the "hillside" and pipe bursting the "hillside" to Llyn Bedwr Mawr, only two shut downs will be needed. The first shut down will allow the open cut section of work to be brought into commission along with the temporary overland rider pipe for phase two. By connecting the overland pipe to the newly commissioned main the risk of manganese disturbance is eliminated. The second shut – off will be to commission the renewed raw water main that would have been replaced in phase two of the work, this would involve disconnecting the overland rider and connecting the main renewed in phase two to the main laid in phase one. Once commissioned the works would be fed from the new main. On commissioning of the new main the overland pipe will be coiled and removed off – site.

The pipe bursting section will allow for the existing main to be worked on. By opting for this method of mains renewal it will minimise the impact the construction will have on the surrounding area by:

- Confining construction traffic along the route of the existing main
- Keeping traffic & work to areas without any archaeological, scientific or ecological interest
- Excavating in disturbed ground.

It is felt that it would be better to take down the stone walls down within the working width of the pipe bursting section. The other option would be to track across long lengths of grassland which could cause an environmental problem in itself to get a gateway which would be wide enough to accept the machinery. This option has been discarded as it would appear this option would be more environmentally damaging as apposed to taking stone walls down, supporting then rebuilding by utilising a stonemason approved by the national park.

2.1 Pipe bursting

"Pipe bursting was first developed in the UK in the late 1970's by D. J. Ryan & Sons in conjunction with British Gas, for the replacement of small diameter, 3" and 4" cast iron gas mains." Najafi M (2007:2)

Pipe bursting is a method of on-line pipe replacement as the existing pipeline is being utilised. It is a replacement method in which an existing pipe is broken by brittle fracture, using mechanically applied force from within. The pipe fragments are forced into the surrounding ground. At the same time, a new pipe of the same or larger diameter is drawn in, replacing the existing pipe. Pipe bursting involves the insertion of a conically shaped tool (bursting head) into the existing pipe to shatter the existing main. The new pipe is pulled or pushed in behind the bursting head. This process will be repeated several times as the rods or cable the head is attached to will only burst 50 – 100m at one time. (Najafi, M 2007:2)

The new pipe and bursting head are launched from the insertion shaft and the cable or pulling rod is pulled from the pulling shaft as shown in Figure 1

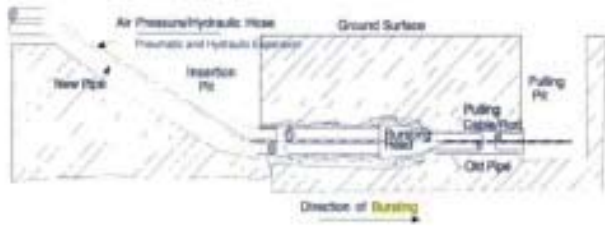


Figure 1: Typical Pipe bursting operation diagram (Data Source Najafi, M 2007:3)

To break the existing pipe, the bursting head receives pulling force from the pulling rods and hydraulic or pneumatic power to the head, based on the pulling system used. The pulling force breaks the pipe expands the diameter of the cavity. The bursting head is then pulled through the debris with the pipe the pulled behind. Each coil of pipe inserted is connected by electro-fusion couplers.

To allow this process to go ahead the existing main must be isolated and have no flows inside. To allow the customers supply to remain constant whilst replacement takes place a temporary overland main (rider pipe) is laid out and connected onto the system. Once the rider is chlorinated the water supplies for each house must then be transferred from the old main onto the rider. This frees the main to be worked as customers can be supplied from a temporary main.

2.2 Benefits of Pipe bursting

Below are some of the benefits pipe bursting has as a method of water main renewal as described by (Najafi, M 2007):

- Efficient method of construction, replacing approx 300-500m per week.
- Can increase the diameter of the existing main, depending on the surrounding ground conditions.
- Reduced risk of ground disturbance.
- Reduced amount of fencing used in both agricultural and urban land.
- Reduction in reinstatement in made and unmade grounds
- Less traffic disruption and management in built up areas.
- Only require stock proof fencing around reception pits and not along the full width of easement.
- Fewer disposals of materials from excavations and savings made on backfill and aggregates.

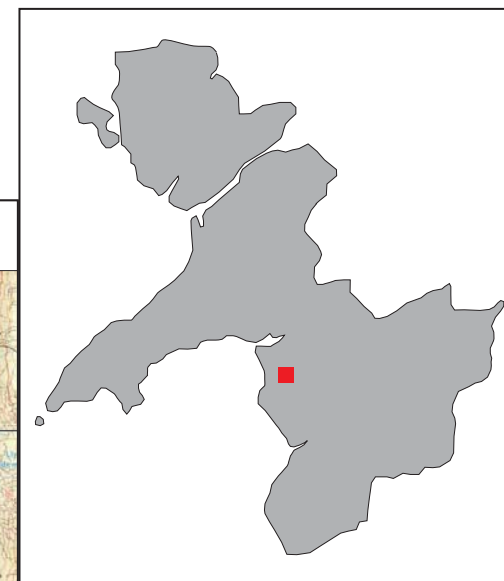
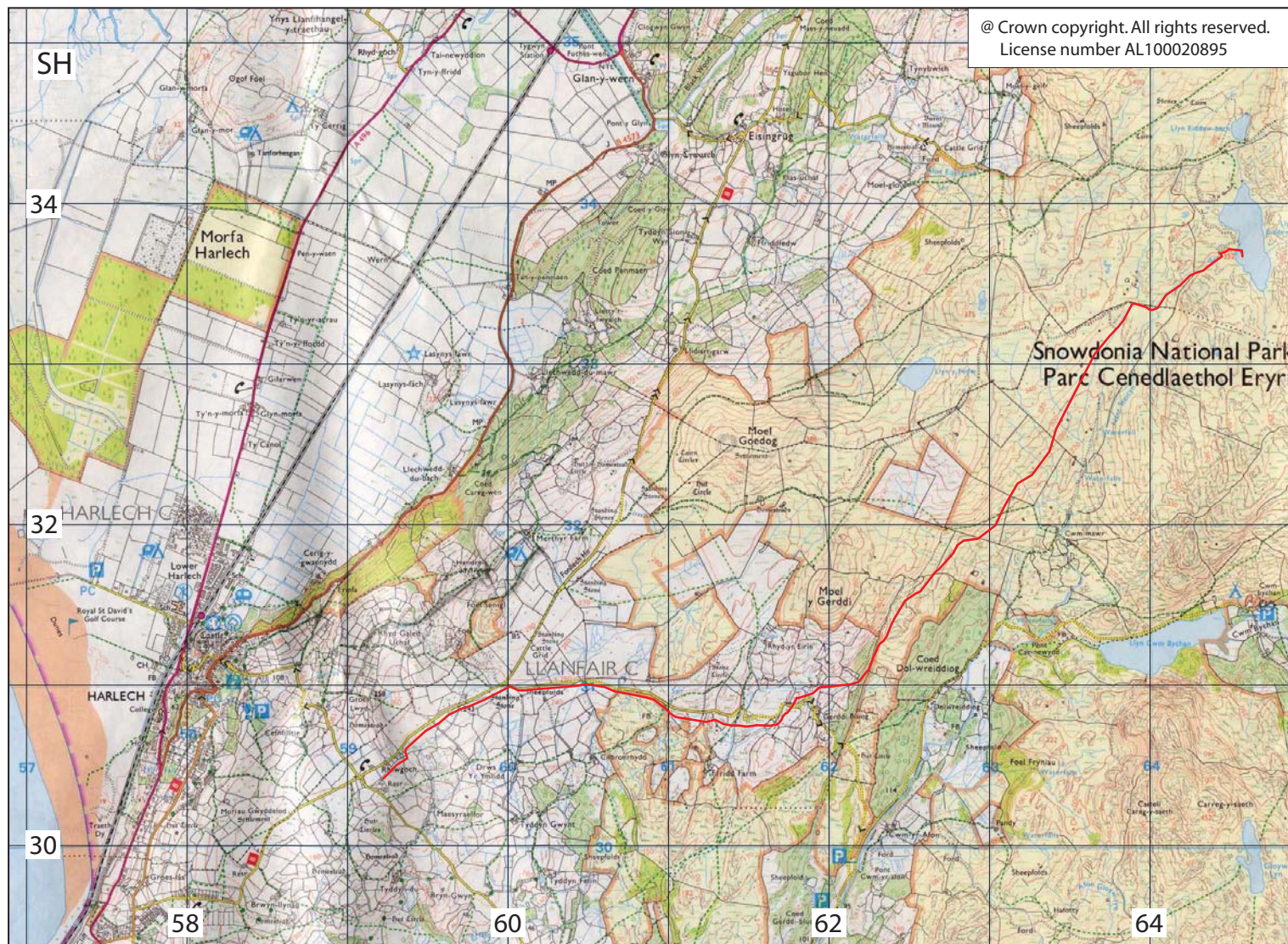


Figure 1. Location of the pipe route
(shown in red)

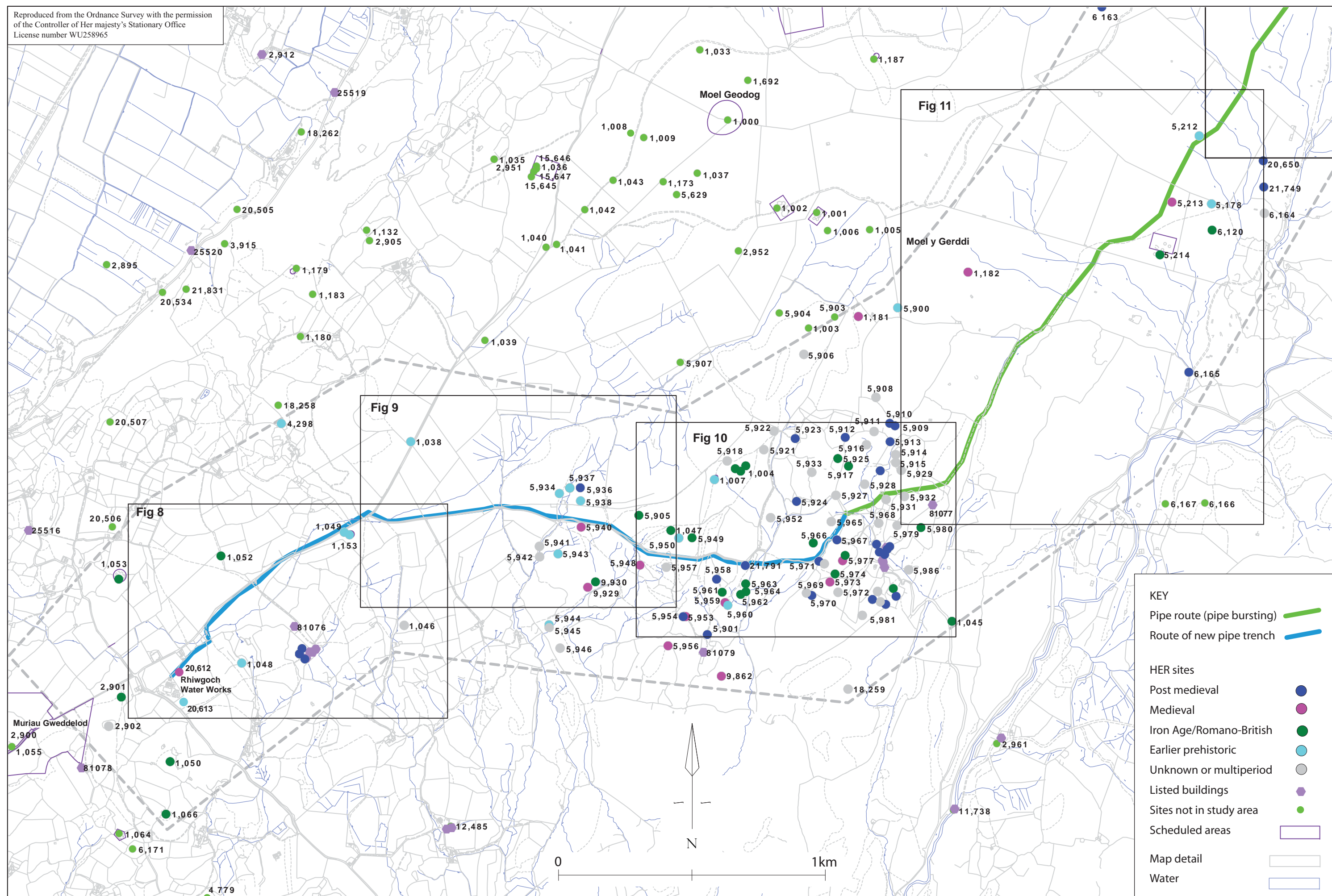


Figure 2. Location of archaeological sites and listed buildings around the pipeline route. The grey dashed line indicates the study area. Sites within this area are coloured to indicate period. These sites are listed in tables 1-3 in appendix I. The black rectangles indicate the location of more detailed plans.

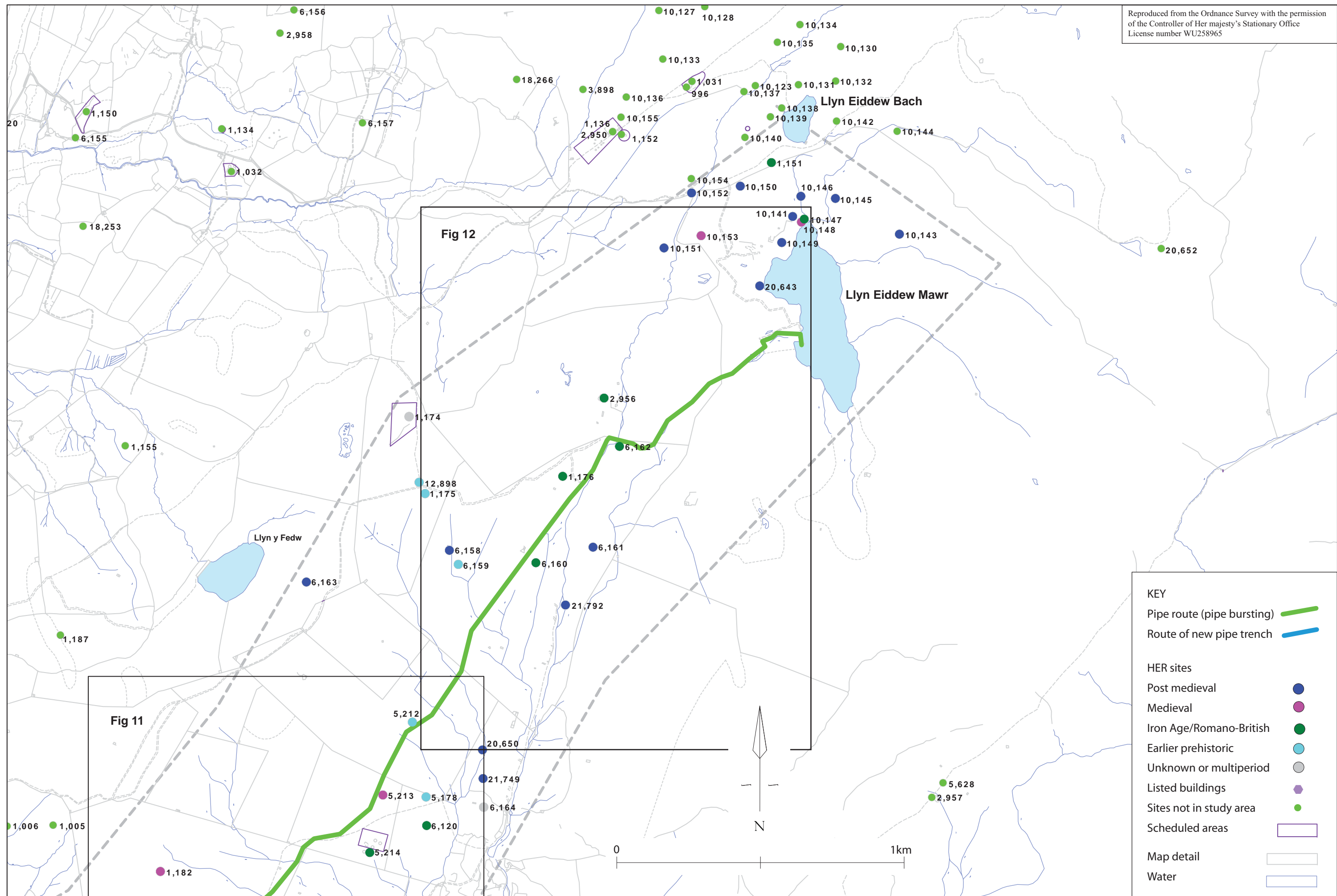


Figure 3. Location of archaeological sites and listed buildings around the pipeline route. The grey dashed line indicates the study area. Sites within this area are coloured to indicate period. These sites are listed in tables 1-3 in appendix I. The black rectangles indicate the location of more detailed plans.

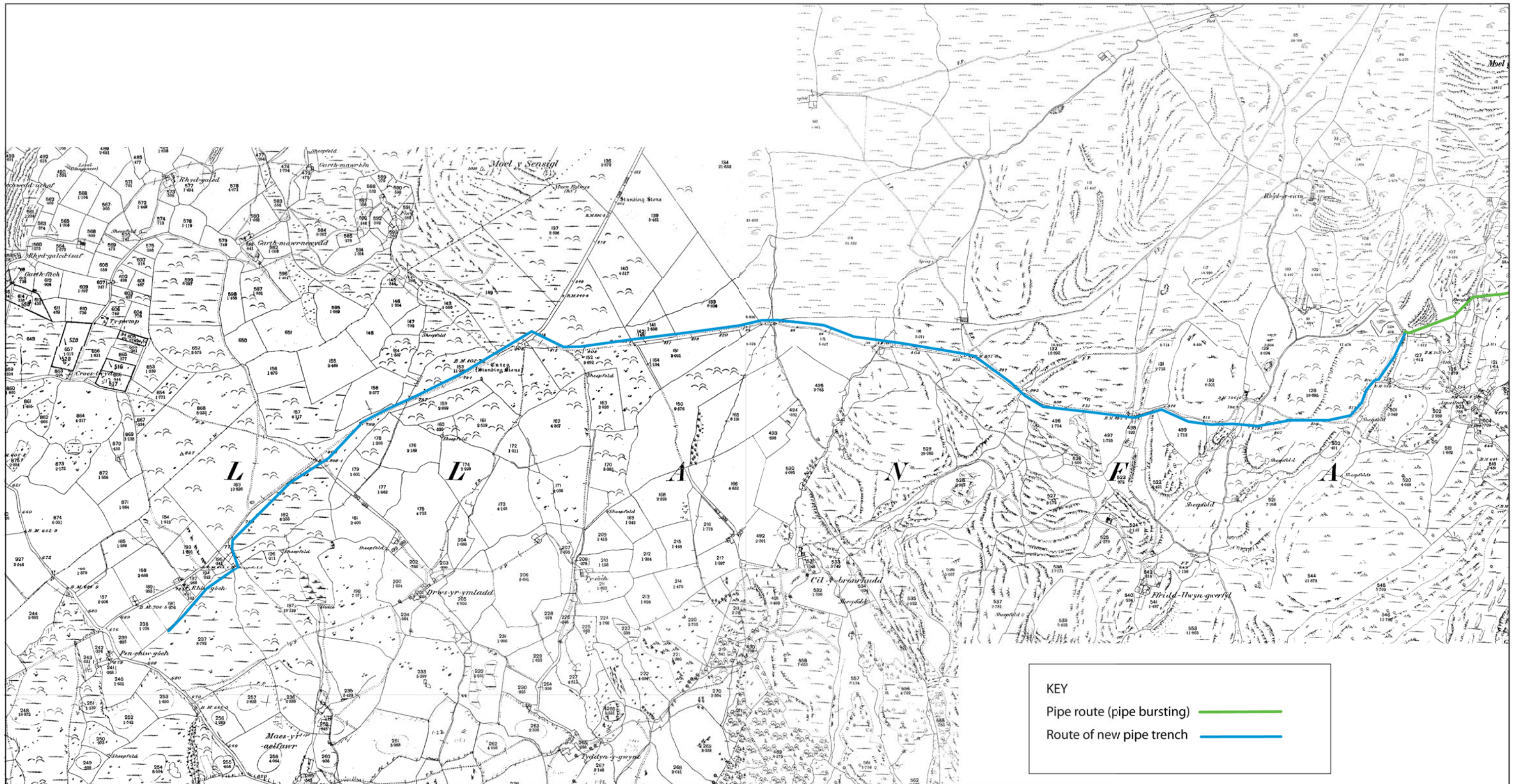


Figure 4. The pipe line route shown overlain on the 25 inch Ordnance Survey First Edition County Series maps (Merionethshire sheets IXX.13, 14 and XXVI.1, 2, published 1889)

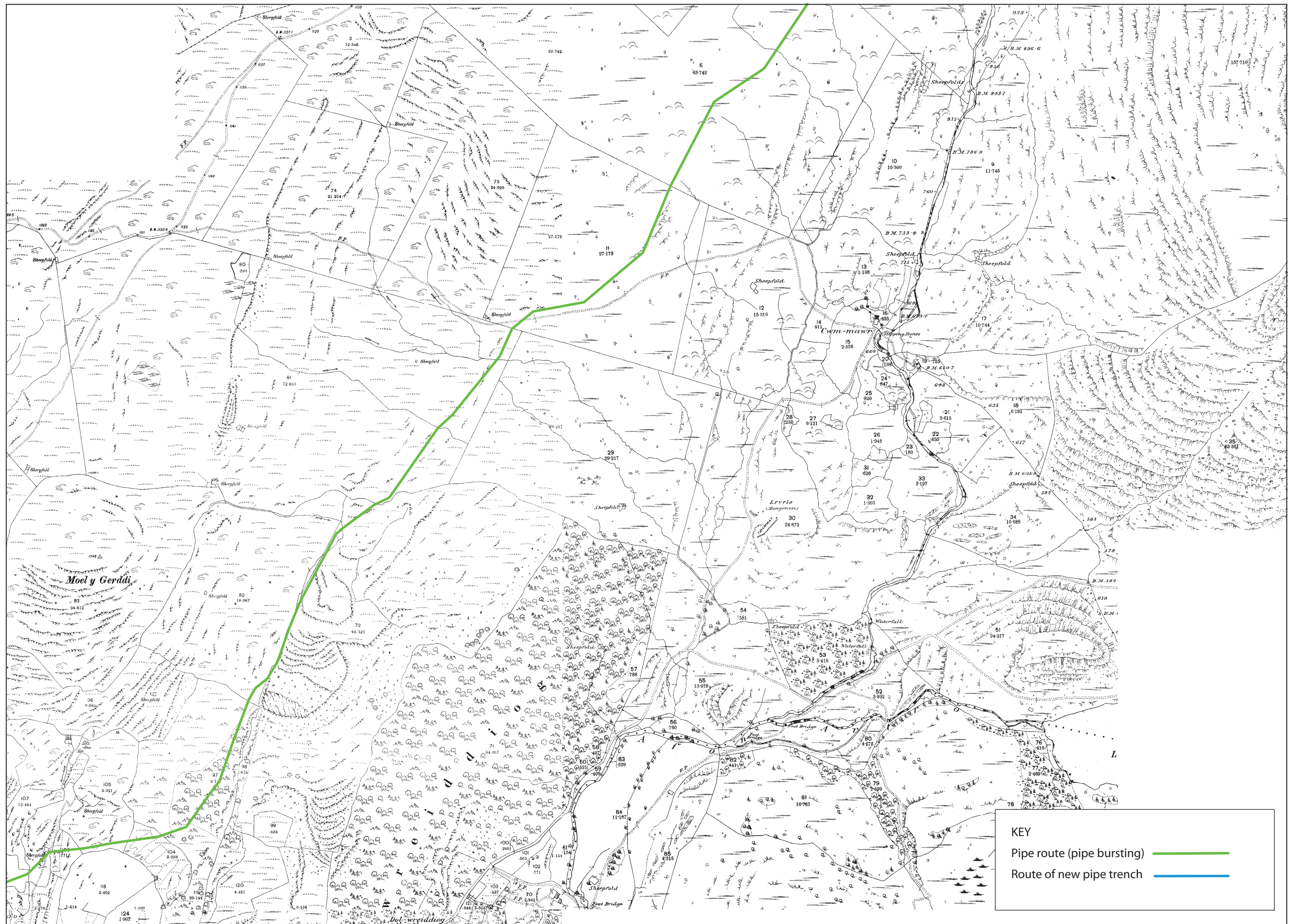
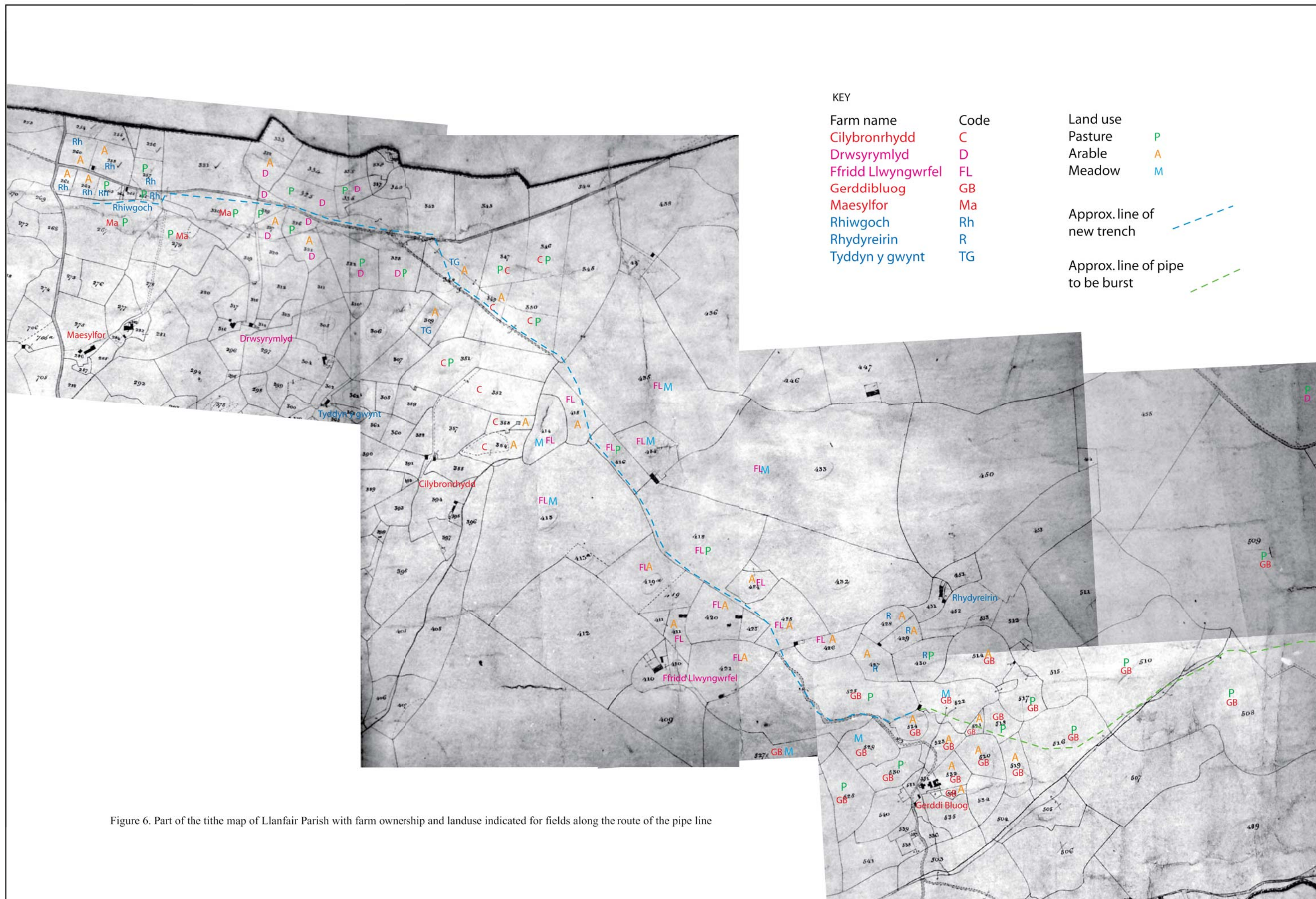


Figure 5. The pipe line route shown overlain on the 25 inch Ordnance Survey First Edition County Series maps (Merionethshire sheets IXX.14 and 15, published 1889). No map is available for the northern end of the route.



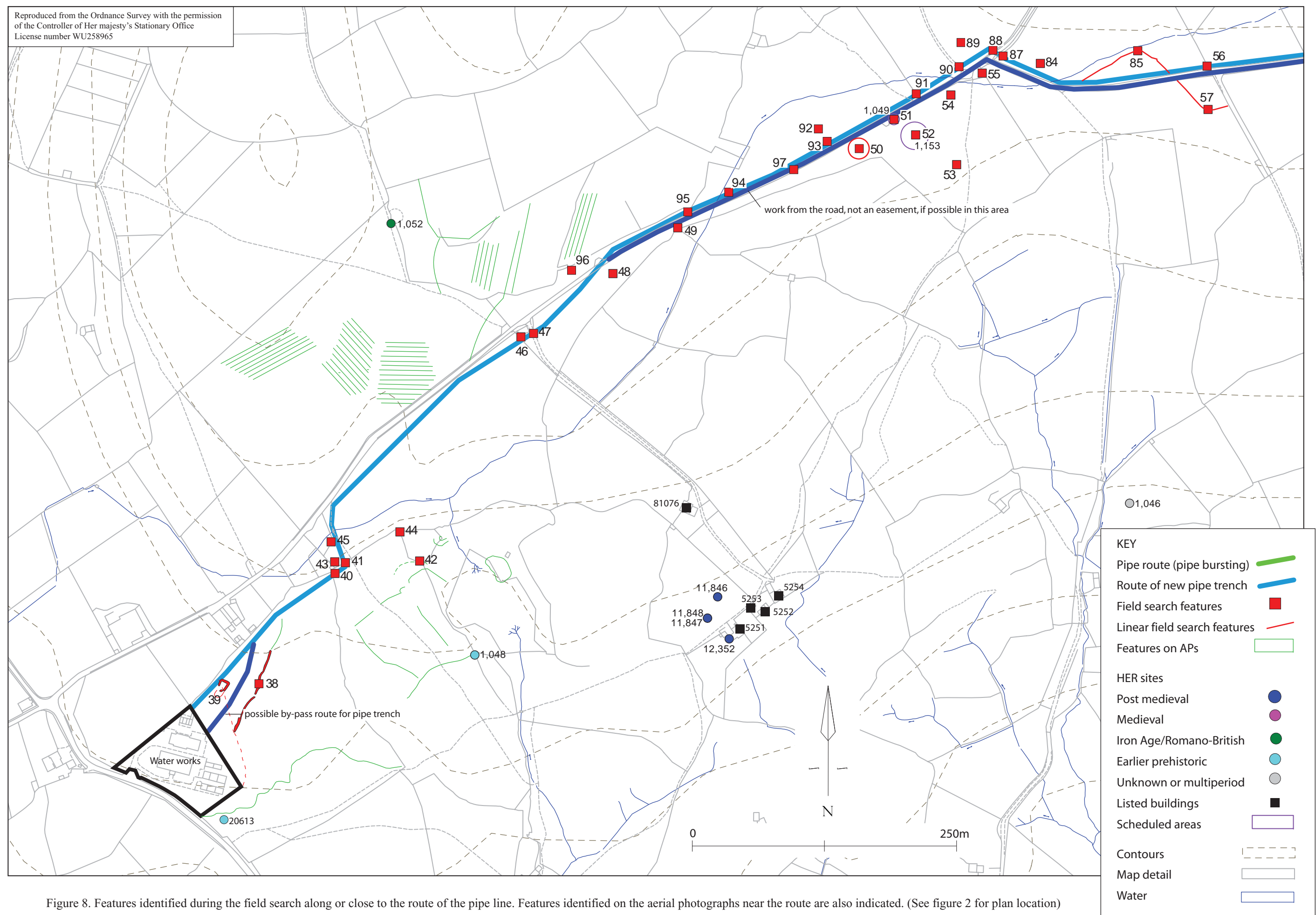


Figure 8. Features identified during the field search along or close to the route of the pipe line. Features identified on the aerial photographs near the route are also indicated. (See figure 2 for plan location)

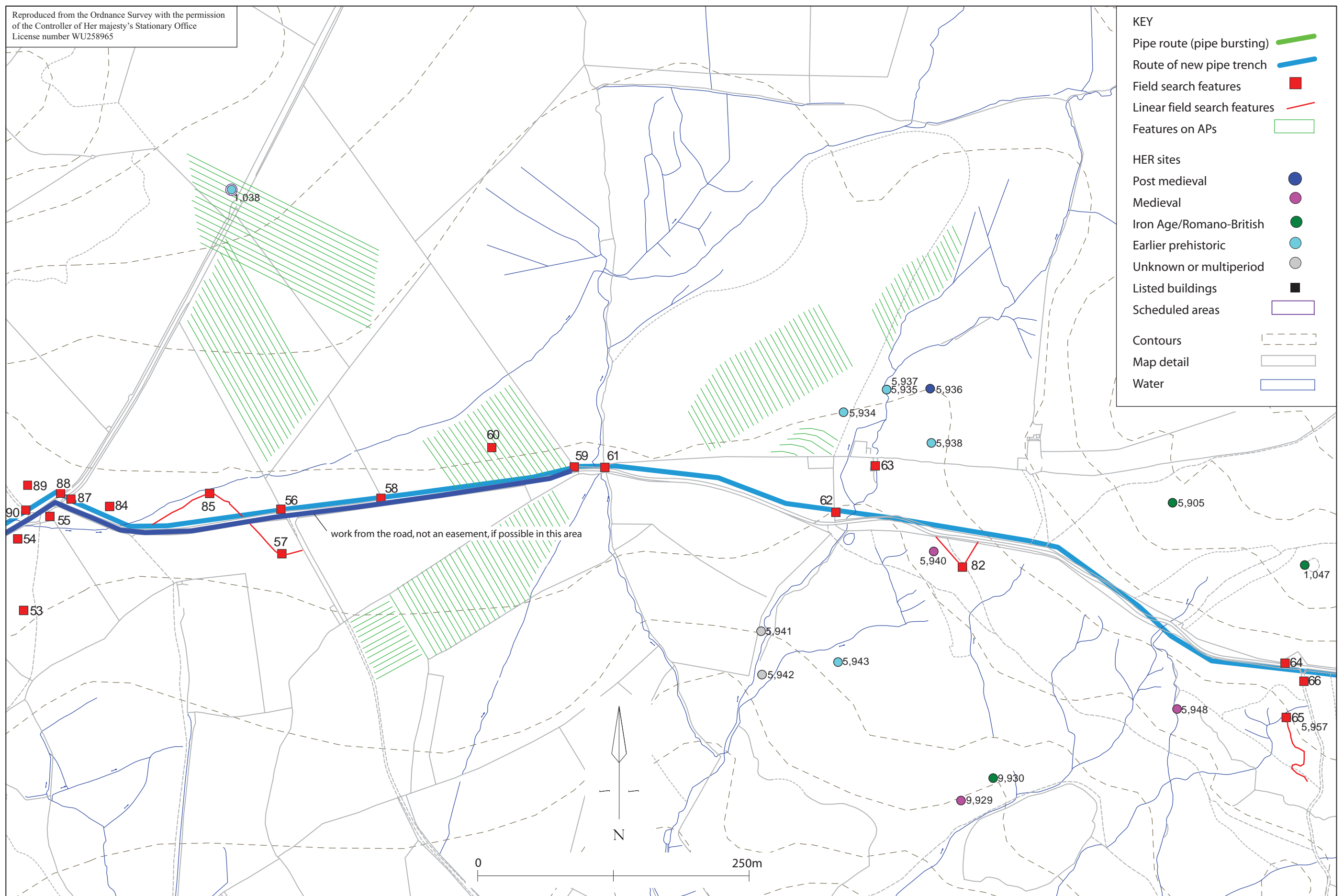


Figure 9. Features identified during the field search along or close to the route of the pipe line. Features identified on the aerial photographs near the route are also indicated. (See figure 2 for plan location)

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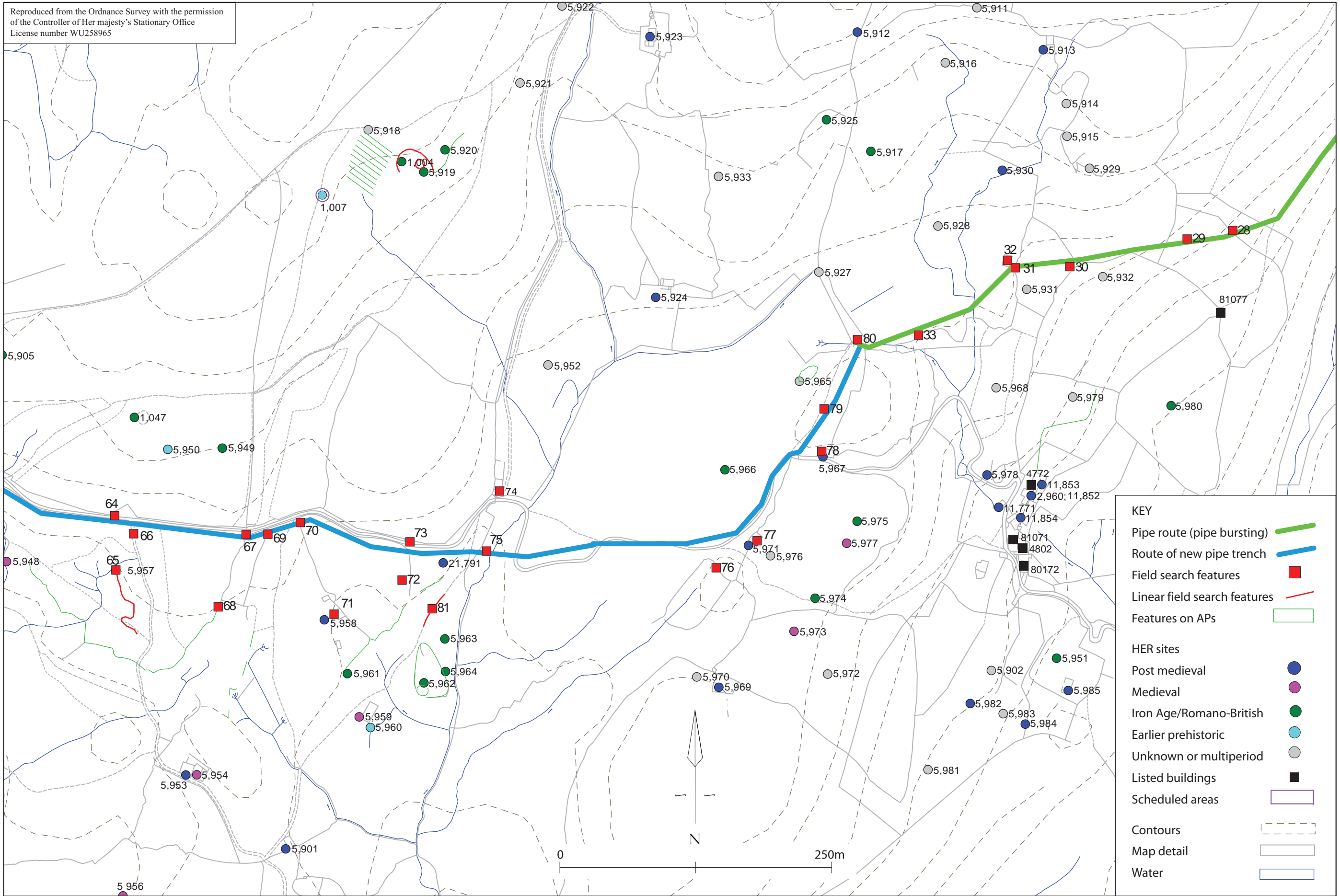


Figure 10. Features identified during the field search along or close to the route of the pipe line. Features identified on the aerial photographs near the route are also indicated. (See figure 2 for plan location)

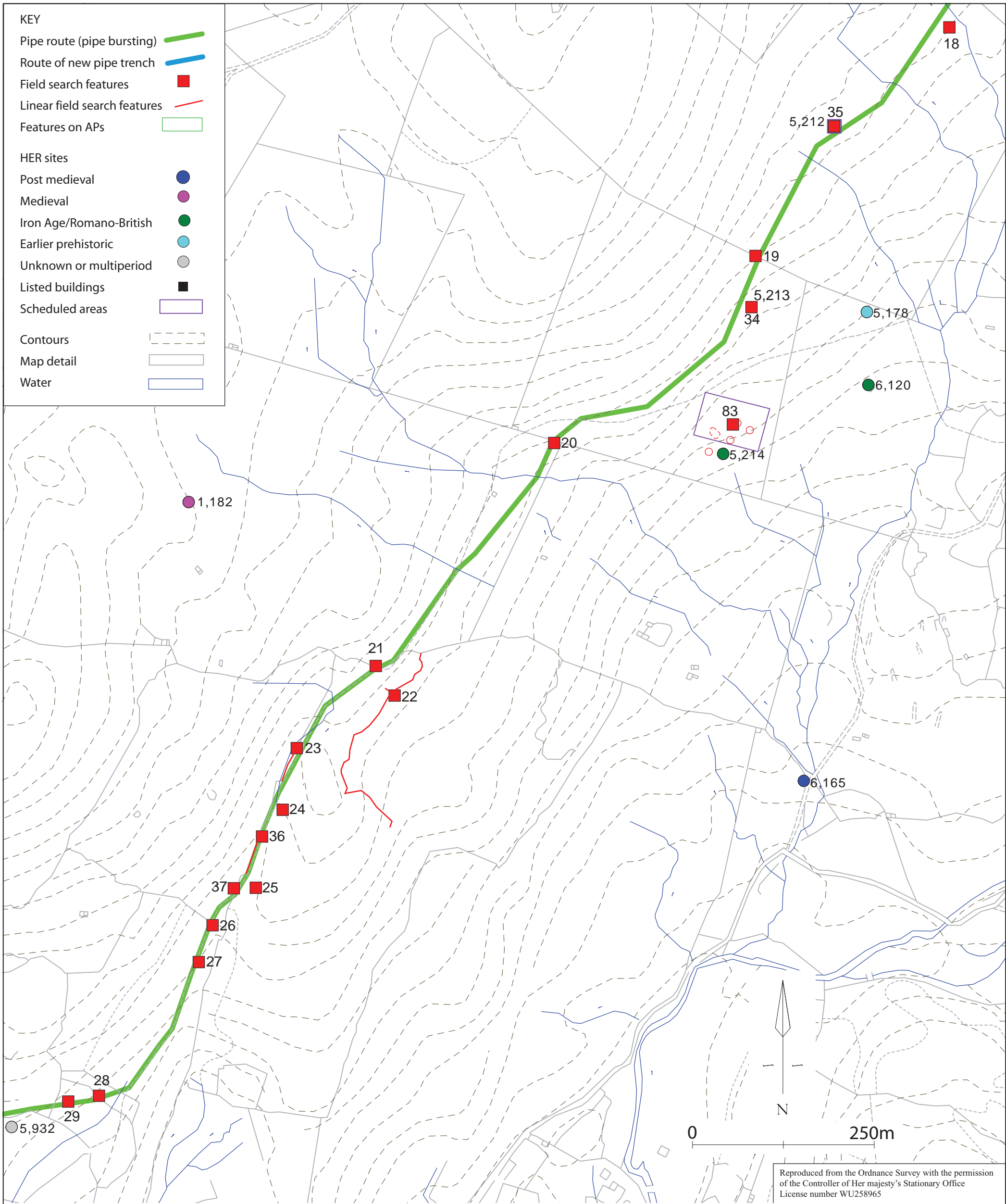


Figure 11. Features identified during the field search along or close to the route of the pipe line. (See figures 2 and 3 for plan location)

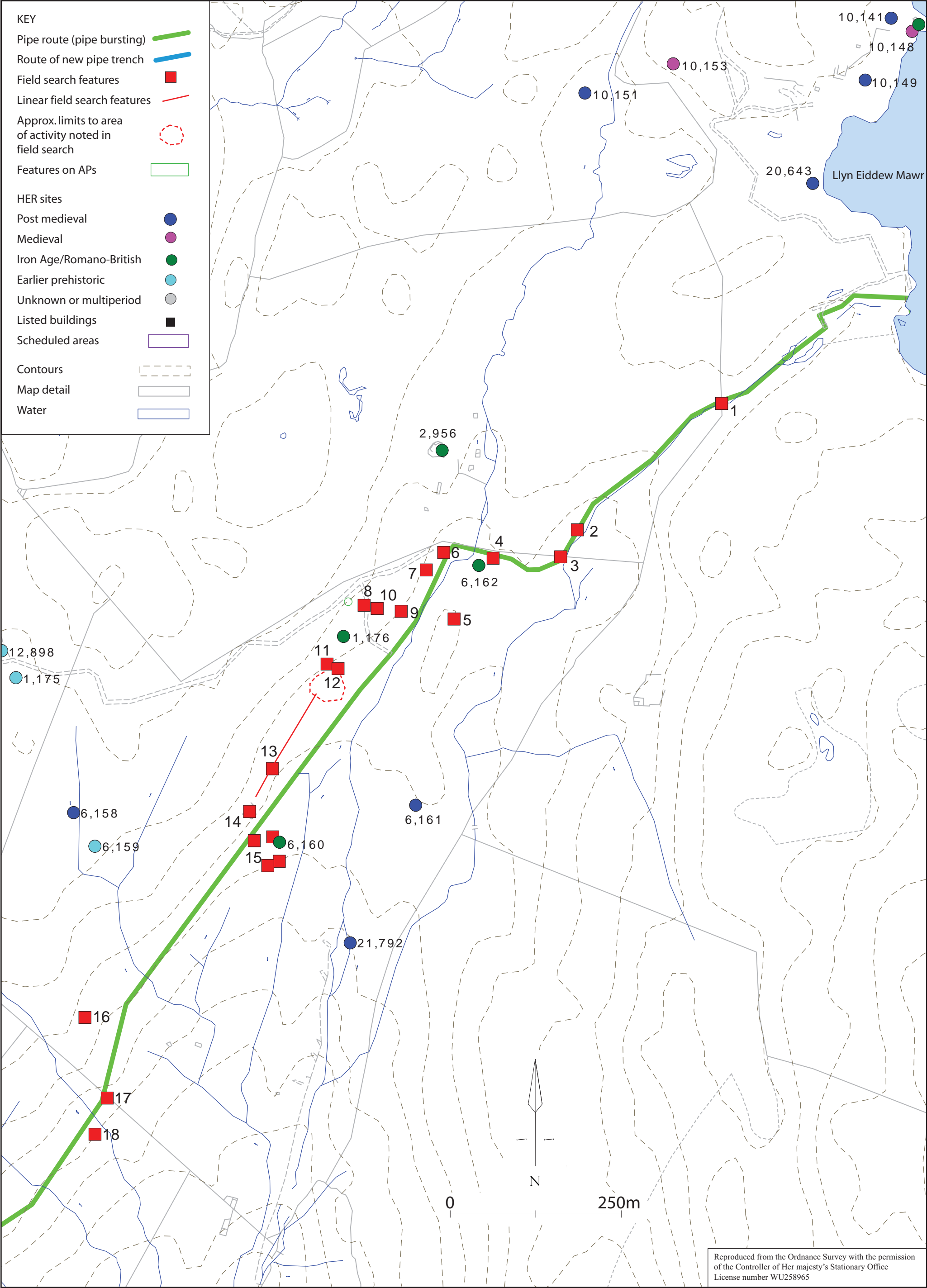


Figure 12. Features identified during the field search along or close to the route of the pipe line. Features identified on the aerial photographs near the route are also indicated.
(See figure 3 for plan location)



Plate 1: Feature 7, a peat stack platform, from the west



Plate 2: Feature 8, a hut circle, from the north



Plate 3: Feature 15, one of four cairns, from the north-west



Plate 4: Feature 18, a possible burial cairn, from the north



Plate 5: Feature 34, a Medieval long hut platform, from the east



Plate 6: Feature 35, Ffridd Fron kerb cairn, from the south-east



Plate 7: Feature 50, a possible ring cairn,
from the north-east



Plate 8: Feature 60, ridge and
furrow, from south-east



Plate 9: Feature 84, a clearance cairn,
from the east



Plate 10: Extract from Ordnance Survey Aerial Photograph 71/234, frame 180 taken on 21st May 1971.
South-west end of pipe route (red line shows pipe route).

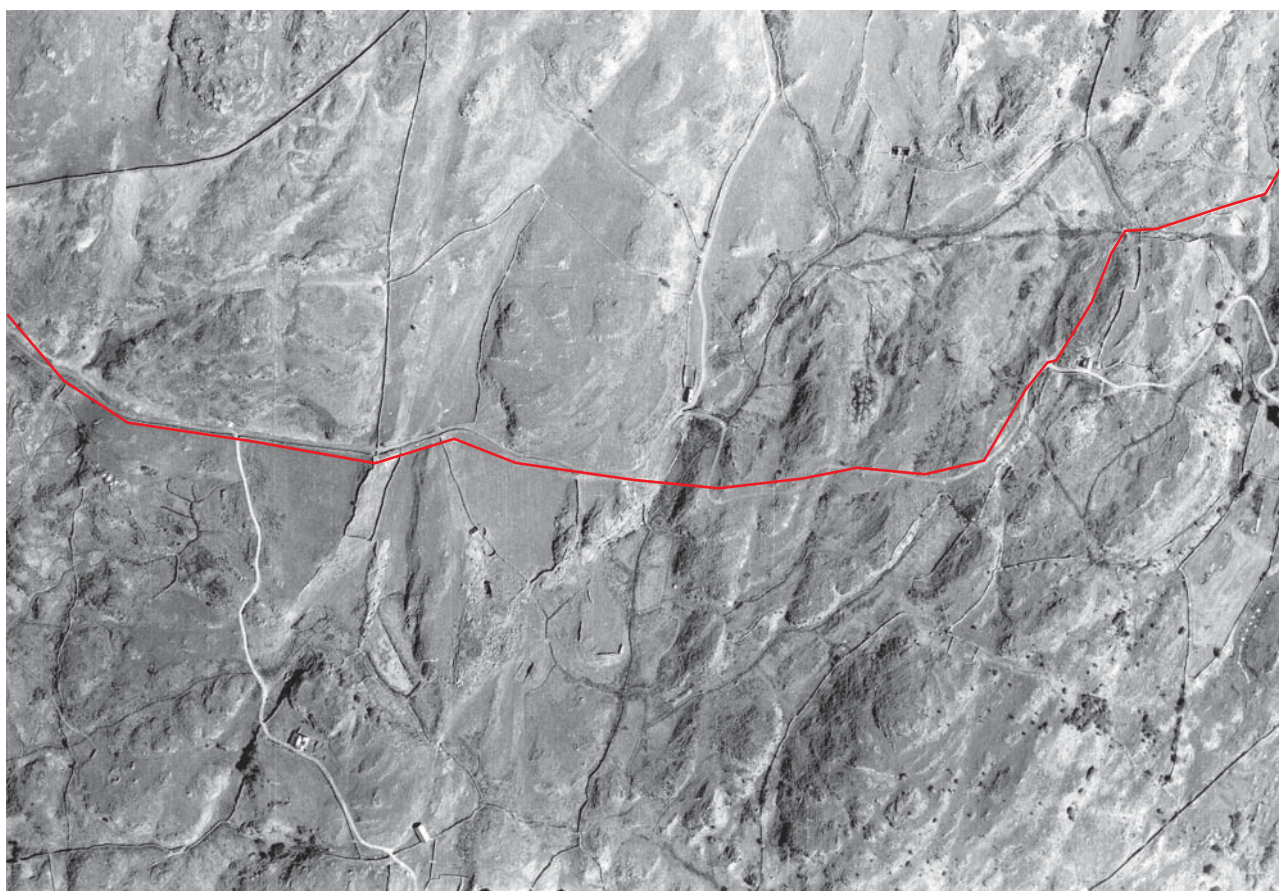


Plate 11: Extract from Ordnance Survey Aerial Photograph 71/234, frame 247 taken on 21st May 1971.
East end of new open trench route, north of Ffridd Farm (red line shows pipe route).



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