

FAIRBOURNE WASTE WATER TREATMENT SCHEME

ARCHAEOLOGICAL WATCHING BRIEF

THE PIPELINE EASEMENT AND TREATMENT WORKS SITE

Report No. 506



The Treatment Works tank construction,
showing estuarine clay revealed beneath the peat and ancient forest horizon

Prepared for
Symonds Group Ltd

November 2003
Revised February 2013

By
G.H. Smith



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Gwynedd Archaeological Trust

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FAIRBOURNE WASTE WATER TREATMENT SCHEME

REPORT ON THE ARCHAEOLOGICAL WATCHING BRIEF

1 INTRODUCTION

Gwynedd Archaeological Trust was asked by Symonds Group to carry out an archaeological assessment in advance of construction of a waste water treatment works and associated pipelines at Fairbourne, Meirionnydd (Fig. 1). Subsequent to production of this assessment and following its recommendations a watching brief was carried out on various parts of the works. This report describes the results of this watching brief, which was carried out in August and September 2003.

The area affected is shown on Symonds Drawing No. 57753LOC1 REV. A (Oct 2002). The main part of the pipeline route extends from Arthog to Fairbourne and a branch joins this from Friog with another to Fegla Fawr, at the north-east. The total length of easement is about 6.5km, with a projected width of 15m, narrowing locally, with various extensions to join with existing properties. In the event the easement was little affected because the good ground conditions because of a dry summer and the relatively narrow trench that needed to be cut meant that the ground was not disturbed. The trench was backfilled and made good in most cases within the same day. The pipe-trench was expected to be c. 0.5m wide and 1.0m deep but most of it was cut by a pipe-laying machine and was only c. 0.30m wide and 1.1m deep.

The area lies partly within the Snowdonia National Park and within a Landscape of Outstanding Historic Interest (HLW Gw 14, Mawddach). This designation reflects a wealth of archaeological and historic remains, of which the Cregennan area of Arthog, adjoining the pipeline route was identified as an area that was ‘...favoured during the Bronze Age for ceremonial and ritual activity’ (Cadw 2001, 121). There was also a lead mine and several small slate quarries and mines, well-preserved examples of the more local scale rural industries of the 19th century. Fairbourne is also an unusual example of a late 19th century ‘new town’, built to exploit the new fashion for tourism and was associated with an unusual complex of passenger tramways. The pipe-line route also adjoins a Site of Special Scientific Interest – the Mawddach Estuary (SSSI 1628, Code 31WVS) of which the Arthog Bog and Afon Arthog form part.

2 THE ASSESSMENT REPORT RECOMMENDATIONS

This repeats the recommendations given in the Assessment Report for comparison with the response from the watching brief.

2.1 Impact of construction on the Landscape of Outstanding Historic Interest

The Mawddach Landscape of Outstanding Historic Interest covers the estuary of the Mawddach, together with surrounding land from Barmouth in the north, to Penmaenpool in the east and to the south of the estuary, the land from Penmaenpool to Cader Idris and west to Llangelynnin. This landscape was recorded as of historic interest partly for the range of prehistoric monuments lying between the Cregennan plateau and Llwyngwril and partly for the well preserved remains of 19th century quarrying and mining on the slopes below Cregennan. All these lie on the hill slopes away from the proposed pipe-line and the pipeline route does not come into contact with the specific elements of the prehistoric landscape and once constructed will be invisible and cause no change to the setting of those monuments. However, it does come into contact with elements of the post-medieval landscape.

The Register of Landscapes of Outstanding Historic Interest states that... ‘The Register should be seen as a positive tool for making necessary change rather than preventing change, and a way of assisting the new to fit in with the old’ (Cadw 2001, xxxix). A summary of the impact on individual archaeological or historic features is provided below (2.3). It is considered that overall, the direct impact of construction on individual features relating to the historic landscape is moderate, in that most of those features are of low value, or can be avoided. The wider impact on the integrity of the landscape is considered to be low in that, once constructed, the pipe-line will be hidden from view

2.2 Impact of construction on individual archaeological or historic features

2.2.1 Prehistoric features

There are several features that will be affected by construction but the most significant impact is that which cannot easily be assessed, that is the larger part of the route which cuts through lowland peat deposits. The peats occupy most of the lowland plain, but probably vary in depth, according to the profile of the underlying clays and in others may have been truncated by widespread post-medieval peat-cutting for fuel. In others they may have removed to allow construction, for instance of the Cambrian Railway track-bed. In greater or lesser depth they are likely to be present along the majority of the pipeline route. They were exposed at the east end of the pipe-line route, where a newly dug drainage ditch was observed. This showed 1m depth of peat, which is about the depth at which the waste water pipe will be laid. Closer to the Arthog creek, an underlying valley profile probably means that the peat will be deeper. Peat can also be inferred to exist under most of the fields between Arthog and Friog because stone-lined drains have become raised to the surface in the pasture, probably because the underlying peat has shrunk due to drying after drainage. Peat is also present immediately east of Fairbourne, where it has been dug out during ditch cleaning, and where there are traces of post-medieval peat-cutting (Feature 3).

The peats probably developed during the latter part of the post-glacial period as sea-levels rose to those of the present day. They can be seen as a series of old land surfaces in which, because of their waterlogged nature, there will be a good environmental record of the prehistoric period. They occur over a very large area and so form more of a geological deposit, of nature conservation value, but in small areas of no particular identifiable archaeological significance. However, they may also contain remains of specific human activity. As marshland, the area would not have been the site of permanent settlement but in recent years extensive remains of seasonal prehistoric settlement have been found in the peats of the Severn Estuary (Bell *et al* 2000). In addition, remains of individual items have been found elsewhere, such as Mesolithic flint points, in association with animal carcasses, presumed to result from hunting activities, as well as fish-traps, tracks, jetties and boats.

Occasionally more spectacular finds of metalwork in peat may represent ceremonial deposits such as the finds from Llyn Cerrig Bach, Anglesey and Flag Fen, Peterborough. In the area of the present study, the Late Bronze Age urn from Arthog may be part of such a deposit. Its exact location, context and circumstances of discovery in 1823 are not known (Hemp 1960). However, its size and completeness suggest that it was not a discard or casual loss. It could have contained a cremation burial or it could have been part of a larger deposit, whether ceremonial or a deliberately hidden hoard. If it were, then it seems likely that other objects would have been found at the same time, but this is uncertain. It was recorded as being found 'in a turbary' and this suggests in a peat cutting bed and any associated finds should have been uncovered if a whole area was being cut for peat. However 'a turbary' can just mean an area of peat, not necessarily being cut, so it could have been found while cutting a drainage ditch, for instance, and other objects, or evidence could survive.

The Arthog creek is tidal and was still used for loading of slate up to the mid 19th century. Its flooding into adjoining fields is only prevented by a high sea-bank. The fact that this tidal water approaches very close to the adjoining hill-slopes makes it accessible and very useful. The bronze urn would have been a very valuable object. Its location, in the vicinity of the Arthog creek is probably significant. Considering the intensity of Bronze Age funerary and ritual features on the Cregennan plateau close by, and the natural route followed by the road connecting Cregennan to Arthog, close to the creek, an association between them is likely (Fig. 3). There is some evidence of prehistoric settlement in the Cregennan area, but it is slight compared to the evidence of prehistoric funerary and ritual activity. It seems more likely that this was a centre to which people came from a wide area. If there were ceremonial deposits of metalwork then we might expect them to be in the Cregennan area, not in the lowland, so a single deposit for funerary purposes or for concealment seems perhaps most likely. However, the evidence suggests that the Arthog creek may have been an important focus for communications in prehistory and there is a likelihood of other finds there, whether more metalwork, or of timber remains such as trackways or jetties.

The pipe-line route in the vicinity of the Arthog Creek is identified as the area of greatest potential for survival of evidence of prehistoric activity. It is therefore recommended that a comprehensive watching brief be carried out during trenching of the route between Feature 18 and Feature 22, at the east end of the route (Fig. 3). It is also recommended that during pipe trenching along this part of the route, time be allowed for archaeological recording and sampling. For the area further away from the creek, prehistoric activity can be expected to have been sparser, such as chance losses associated with hunting or wildfowling. In addition, peat is likely to be

shallower and survival of organic remains may be reduced because of the drying out of peat in drained and improved fields. An intermittent watching brief is therefore recommended as more appropriate in these areas.

2.2.2 Post-medieval features

With regard to features of more recent date, the area is one that is surprisingly complex because of the presence of several tramways, railways and tracks. The archaeological remains associated with these are principally the track beds, of which the Solomon Andrews tramway and the Arthog Quarry tramway are the more important. A comprehensive watching brief should be maintained during excavation of these features, together with recording of a section through the remains and observation for associated finds.

The important Second World War sentry boxes at Fegla Fawr (Feature 13) require a watching brief to be maintained to ensure safety of the structures, although the anti-tank defences at Fairbourne (Feature 5) should remain unaffected. The majority of the remaining features can be avoided, or are of insufficient value to warrant further work.

2.3 Summary of recommendations for mitigatory measures

Nil	Features 1, 3, 6, 7, 9, 15 and 19.
Avoidance	Features 2, 4, 5, 10, 11, 14 and 20.
Avoidance with watching brief	Feature 13 (WWII sentry boxes).
Re-instatement	Features 16 and 17 (Trackways).
Intermittent watching brief	Feature 12 (Tramway).
Intermittent watching brief	Peat beds in areas L1-5, L9, L14
Comprehensive watching brief and Reinstatement	Feature 18 (Trackway and tramway).
Comprehensive watching brief with detailed recording and sampling	Between Features 18 and 22 (Afon Arthog peat beds).

3 RESULTS OF THE WATCHING BRIEF

3.1 Introduction

The construction of the pipeline resulted in some temporary disturbance of the value of the historic landscape by way of erection of a temporary fenced storage compound, storage and use of machinery, and construction of trackways. However, once finished there will be no visible change to the landscape or affect on the way it is used. Only the above ground part of the scheme – the Treatment Works itself – will be visible.

With regard to individual features observed during the assessment the greatest impact was observed to be on the buried prehistoric peat levels expected to be present over much of the route. The peat is a natural deposit but is in effect a buried ancient land surface that developed during the post-glacial period. Finds from buried peat elsewhere show that it can preserve remains of human activity from the Mesolithic period onwards. It is therefore important to observe any extensive exposure of peat for such remains. Here the watching brief was recommended to be concentrated on the eastern end of the route around the Afon Arthog (Fig. 1 Areas E and F).

3.2 AREA A: The Fairbourne branch of the pipeline 27th August 2003

The pipe trenching was underway in the field on the Fairbourne side of the railway line close to the treatment works site. Work happened to have stopped while awaiting a delivery of pipe and a length of trench was open for observation. The pipe was laid in a very narrow trench, c. 0.3m wide and c. 1.25m deep. The subsoil levels

were visible because there the long spell of dry weather meant that there was no ground water. It was possible that could have been present but it was suggested in the assessment report that this area might be just of clay on the evidence that clay pits had been dug close by for the McDougall brick works during the construction of Fairbourne in the 1890's. In the exposed area here at least the deposits below the topsoil were all grey-brown silty clay to the depth of the trench as shown most obviously in the material excavated from the trench (Fig. 4).

3.3 AREA B: The waste water treatment works site, 27th August 2003

The watching brief was designed to cover the deep excavation for the wastewater holding tank at c. SH62051330. The excavation was to take place within a rectangular area of steel piling that had already been driven into place (Fig. 5). Excavation was delayed because of standing water on the surface and at a high level in the pipe of a test boring which was thought to show that the ground was totally waterlogged and so could not be dug until a pump arrived and this had not been pre-ordered. However, a start at excavation showed that the surface water had simply collected on top of the ground compressed by machine trampling. The bore-hole water was high because of ground pressure. The excavated soil was found to be dry and no ground water was encountered.

All the excavated soil was of peat, which was fibrous and had no visible stratigraphic breaks. The lowest level was better preserved and contained tree remains which appear to have grown on a peaty surface that had formed immediately on top of the grey clay with many roots penetrating into the clay. Peat had then continued to accumulate, burying the tree remains. The tree remains included the boles and part of the trunks of two trees that were still *in situ* but which had fallen or blown over. Both seem to have fallen in the same direction, towards the north-east, possibly blown over by a south-westerly wind. The largest trunk was about 4m long and 0.5m dia. (Fig. 6). The tree was removed by machine and put to one side. A section of the tree was later cut by the contractors for possible use by Nigel Nayling in developing a dendrochronological curve for Wales. Neither trunk had any attached branches. The smaller trunk was about 1.5m long, above the bole. There were also two large, less well preserved trunkless boles that appeared to be more ancient, as if decayed before being buried by the peat accumulation. There were also occasional short lengths of anciently broken branches in the peat but no obvious twiggy or brashy material.

The peat continued to a depth of 1m below the present ground surface at which level grey estuarine clay was encountered (Fig. 7). This happened to be the level at which excavation was halted because of the need to reinforce the rim of the piling before deeper excavation continued. The peat had been expected to be deeper here because a trial hole further to the east (i.e. inland) had shown over 2m depth of peat. It is suggested therefore that the peat was deeper there because of the presence of a palaeo-channel or lagoon.

3.4 AREA C: The Fegla Fawr trackway branch of the pipeline, 18th September 2003

Another large tree had been encountered by the contractors as an obstruction during excavation of the pipeline trench alongside the Fegla Fawr (Mawddach Crescent) trackway. The tree had been lifted out and left on the surface (Fig. 8). It was a trunk and bole about 4m long and 0.75m diameter. However, although larger than the tree found in Area B it was in poorer condition and its stratigraphic position had not been verified so no sample was taken.

3.5 AREA D: The pipeline north of Arthog Terrace, 18th September 2003

The cutting of one part of this was observed, showing a deep level of wet peat to the full depth of the trench at c. 1.1m. No woody remains were seen.

3.6 AREA E: The Arthog Hall to Afon Arthog pipeline, 18th September 2003

The pipe trenching worked westwards from the Afon Arthog. The trenching machine consists of a tracked tractor unit with a long thin, blade-like back arm on which is a chain with cutting blades and at the top a rotating spiral cylinder that throws to one side the earth brought up by the cutting arm. The arm cuts a neat slot about 0.30m wide and about 1.10m deep. The narrowness of the trench and its instability make it difficult to

observe what is being cut into. Also, the knife action of the arm smears the sides and bottom of the trench and the action of the cutting arm and spreader minces and mixes the excavated soil. The plastic pipe is dropped into the trench immediately behind the trencher and backfilled by a following mini excavator (Fig. 9). Minor earthwork features such as a pit would be unlikely to be identified. However, any major features or structures should be seen and any finds would be more likely to be seen than if dug in bucketfuls by an excavator because the spreader breaks up the soil and makes objects more visible.

Most of the subsoil was peaty silt with a layer of preserved roots or brashy material in a peatier layer towards the base of the cutting. This was similar to the section previously seen in a freshly cut ditch on the east side of the Afon Arthog during the initial assessment. Only one larger branch was seen and no trunks or boles. Close to the Afon Arthog an area of cobbles and silt was encountered possibly an earlier stream channel or recently dumped material because the Afon Arthog was canalised at this point during the 19th century, running in a straight line between Pont Arthog and the creek with a high artificial flood bank alongside it.

Several stone-built culverts were crossed by the pipe trench. They were very shallow, their cover stones actually slightly above the field surface, presumably due to shrinkage of the peat. There were also several round-sectioned clay pipe drains at deeper depths.

The trenching reached the Arthog Creek trackway and stopped at that point because the pipe was to cross the stream by mole boring.

3.7 AREA F: The pipeline east of Afon Arthog, 26th September 2003

The route of the trench was realigned from that originally specified at the suggestion of the landowner, Mr Skulford of Bont, Arthog. The original route would have crossed a level area of what was fairly certainly deep peat further to the west. The new route (Fig. 1) took it further to the south-east to run alongside the wall of the walled garden there, formerly belonging to Ty'n y Coed Hall. This took the new pipeline somewhat further inland where the ground could be seen to rise slightly and being so close to the garden wall was unlikely to be part of the 'turbary' where the Late Bronze Age urn had been found in the 19th century. The ground there had already been disturbed by the construction of a mains water pipe. The new route therefore was of less archaeological potential than that originally proposed.

The trench was to be dug by mini-excavator here because of the lack of access for the trenching machine. The trench was dug to the same depth (0.30m wide and 1.10m deep) making the subsoil difficult to observe. The pipe was put into the trench immediately it was dug and backfilled shortly after.

For 35m east of the Afon Arthog the ground surface sloped up towards the river bank. This proved to be because of a thick spread of cobbles and gravel. These thinned out at about 35m east of the river and changed to clayey silt over woody peat (Fig. 10). This continued to about 41m east of the east corner of the walled garden where the peat thinned out and changed to silty clay with an organic top horizon. In three places the peat dipped into channels or hollows. Samples of wood (probably birch to judge by the preserved bark) were taken at 0.60m depth at 30m east of the east corner of the walled garden and at 1m depth at 35m west of the ditch at the east side of Mr Skulford's property.

A complete, well-preserved cattle skeleton was discovered at 0.80m depth at about 10m west of the ditch at the east side of the property (Fig. 11). The skull of the cattle was horned with the horn sheaths and cores still preserved and there was also smelly organic fluid associated with the body. It appeared to have been laid in a shallow cut or possibly ditch or hollow in the top of the peat. It was therefore not of archaeological interest and probably a fairly modern diseased burial. According to Mr Skulford, this must be at least pre-1950 AD as no cattle have been kept there in recent years.

4 SUMMARY

4.1 The watching brief was carried out as specified.

4.2 Those features recommended to be avoided: Features 2, 4, 5, 10, 11, 13, 14 and 20, were undisturbed as far as could be seen.

4.3 Those features recommended to be re-instated - Features 16 and 17 (Trackways) were in the event not disturbed because the pipe was mole-drilled under the trackways.

4.4 The Solomon Andrews tramway track bed (Feature 12) now forming the modern trackway to Mawddach Crescent was recommended to have an intermittent watching brief. However, this was not disturbed because the pipeline was dug alongside the track bed, not through it. As far as could be seen the pipeline excavation did not disturb any of the remains of the World War II camp 'Iceland' at Mawddach Crescent.

4.5 The Arthog Creek trackway and tramway (Feature 18) were recommended to have a comprehensive watching brief and reinstatement. This proved to be unnecessary because the pipeline was mole drilled under the trackway and tram bed.

4.6 An intermittent watching brief was recommended for the expected peat beds over most of the route and a comprehensive watching brief with detailed recording and sampling between Features 18 and 22 (the Afon Arthog peat beds). Peat was encountered in most areas, as expected. This included preserved tree remains, the best in Area B, the Treatment Works site. The Assessment Report identified the area around the Arthog Creek as that of greatest interest because of the previous finding of a rare type of Late Bronze Age bronze urn there and because of the possible importance of the Arthog Creek as a prehistoric route. Subsequent to the Assessment Report the route was modified to run closer inland and this meant that less peat was exposed than had been expected and no remains of archaeological value were encountered.

4.7 A sample of the timber from Area A was taken by Nigel Nayling of the University of St David's, Lampeter. The timber was sectioned and the timber growth rings measured and tabulated. The growth ring sequence could not be matched with any existing sequences so could not be dated. However, as the dendrochronological sequence for this North Wales during the prehistoric period has not yet been identified the section may in future be matched and prove useful, in combination with the radiometric date received, see below.

4.8 Scientific radiocarbon dating work on timber samples was identified as part of the watching brief project design.

Sample 1 was taken from the outermost rings of a fallen tree trunk of oak that *in situ* in the peat at 1m below present ground level, lifted during excavation of the peat for the holding tank of the waste water treatment works site (Area A). This produced a determination of 3550 \pm 60 BP (Beta 193839), 2030-1730 Cal BC at 95% probability.

Sample 2 was a piece of small branch wood of birch, one of several pieces from peaty soil near the base of the pipe trench at a depth of about 1m below present ground level at the east end of the pipe-line, just north of Bont Arthog (Area F). This produced a determination of 3300 \pm 70 BP (Beta 193840), 1740-1420 Cal BC 95% probability.

These dates indicate a time when the land close to the coast edge was affected by increasingly wet conditions either due to the post-glacial rise in sea-level or to deterioration in climatic conditions. Land that had been mature forest turned into wetland and peat developed. The sea-level may have fallen again or climatic conditions improved but in the post-medieval period much of this land was drained to create pasture, as some of it is at present. The dates are interesting because they show that this forest began to decline about the beginning of the second millennium BC, the Early Bronze Age. By the time of the deposition of the Arthog bronze bucket in the early first millennium BC therefore this area was probably all peat bog.

5 REFERENCES

- Bell, M., Caseldine, M. and Neumann, H., 2000. *Prehistoric intertidal archaeology in the Welsh Severn Estuary*, CBA Res. Rep. 120, Council for British Archaeology, York.
- Cadw 2001. *Register of Landscapes of Historic Interest in Wales: Vol. 2.1, Landscapes of outstanding historic interest*, Cadw, Cardiff.
- Hemp W.J. 1960. The Tale of a Bucket, *Journal of the Merioneth Historical and Record Soc.*, III, pt IV, 353-9.

APPENDIX 1

RADIOCARBON DATING

G1762 Fairbourne

FROM: Darden Hood, Director (mailto:<mailto:dhood@radiocarbon.com>)
(This is a copy of the letter being mailed. Invoices/receipts follow only by mail.)

August 5, 2004

Mr. George Smith
Gwynedd Archaeological Trust
Craig Beuno, Ffordd y Garth
Bangor
Gwynedd, North Wales LL57 2RT
UK

RE: Radiocarbon Dating Results For Samples G1762-1, G1762-2

Dear George:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses went normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Our invoice is enclosed. Please, forward it to the appropriate officer or send VISA charge authorization. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,



Mr. George Smith

Report Date: 8/5/2004

Gwynedd Archaeological Trust

Material Received: 7/9/2004

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 193839 SAMPLE : G1762-1 ANALYSIS : Radiometric-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal BC 2030 to 1730 (Cal BP 3980 to 3680)	3550 +/- 60 BP	-25.0* o/oo	3550 +/- 60* BP
Beta - 193840 SAMPLE : G1762-2 ANALYSIS : Radiometric-Standard delivery MATERIAL/PRETREATMENT : (wood): acid/alkali/acid 2 SIGMA CALIBRATION : Cal BC 1740 to 1420 (Cal BP 3690 to 3380)	3300 +/- 70 BP	-25.0* o/oo	3300 +/- 70* BP

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25;lab. mult=1)

Laboratory number: **Beta-193839**

Conventional radiocarbon age¹: **3550±60 BP**

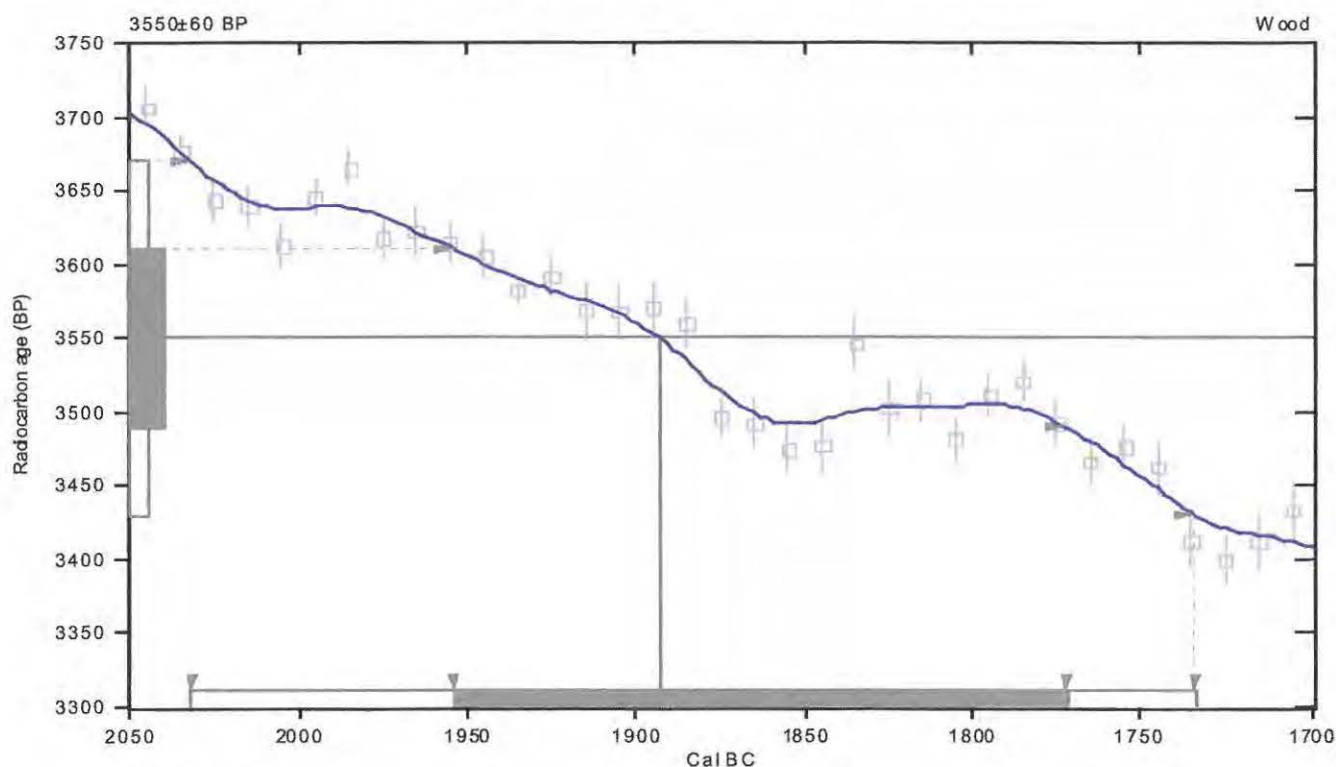
2 Sigma calibrated result: Cal BC 2030 to 1730 (Cal BP 3980 to 3680)
(95% probability)

¹ C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal BC 1890 (Cal BP 3840)

1 Sigma calibrated result: Cal BC 1950 to 1770 (Cal BP 3900 to 3720)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25;lab. mult=1)

Laboratory number: **Beta-193840**

Conventional radiocarbon age¹: **3300±70 BP**

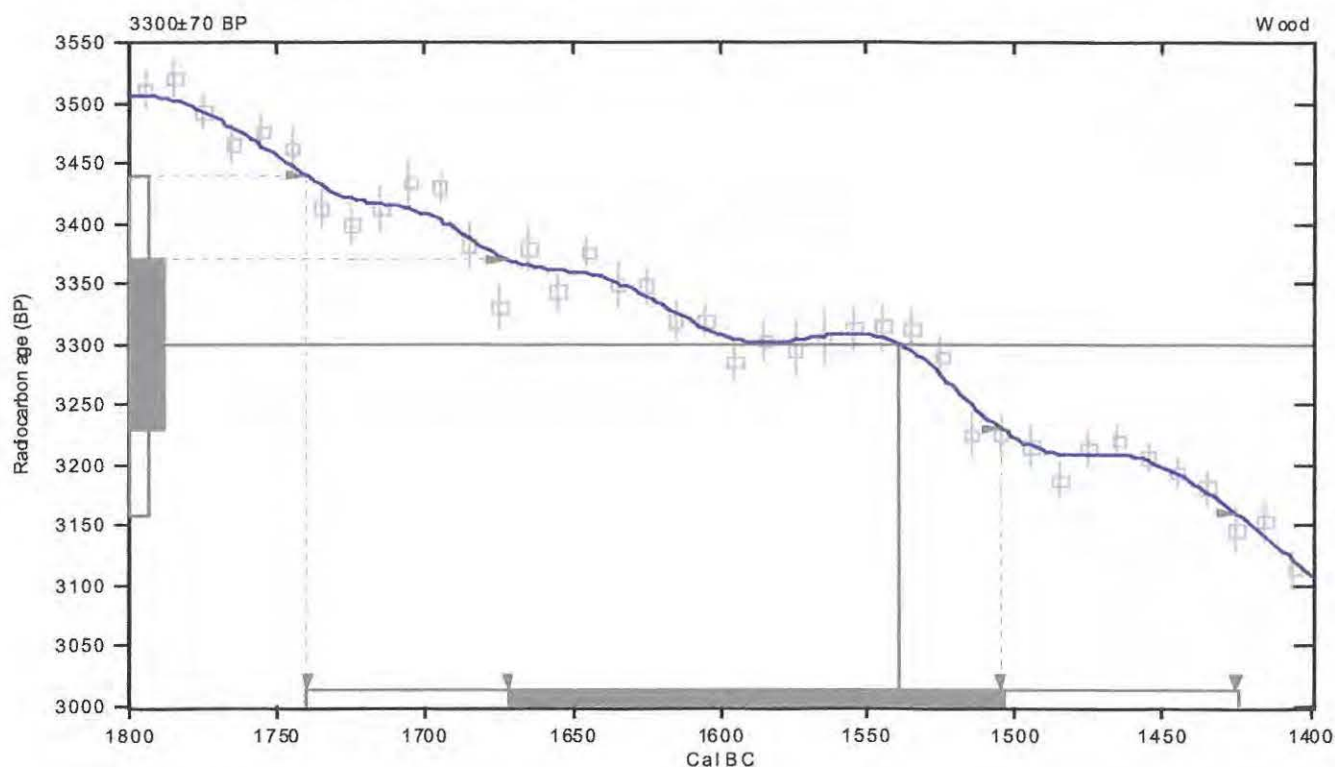
2 Sigma calibrated result: Cal BC 1740 to 1420 (Cal BP 3690 to 3380)
(95% probability)

¹ C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age
with calibration curve: **Cal BC 1540 (Cal BP 3490)**

1 Sigma calibrated result: Cal BC 1670 to 1500 (Cal BP 3620 to 3460)
(68% probability)



References:

Database used

INTCAL98

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxi-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

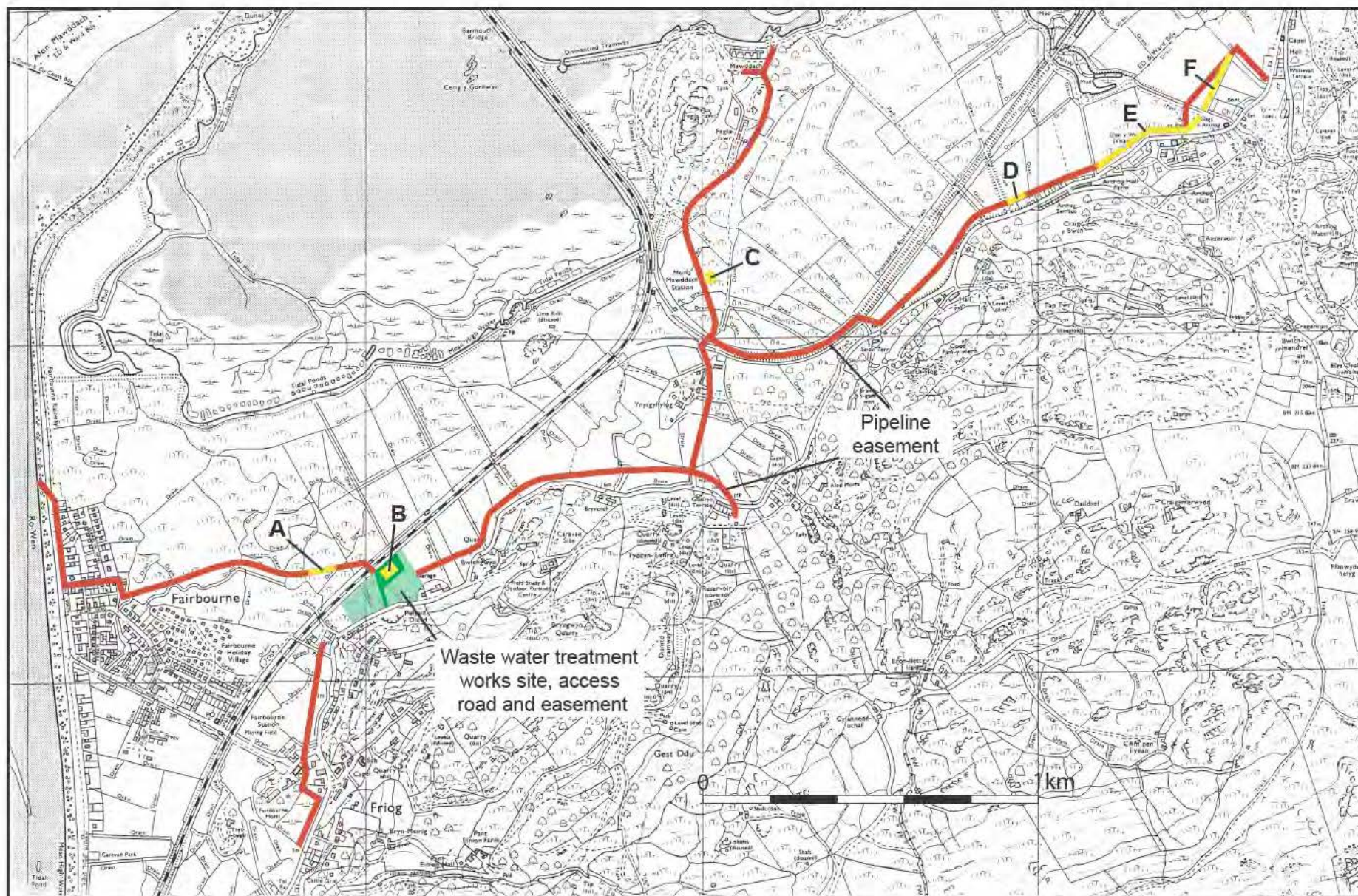
Mathematics

A Simplified Approach to Calibrating C14 Dates

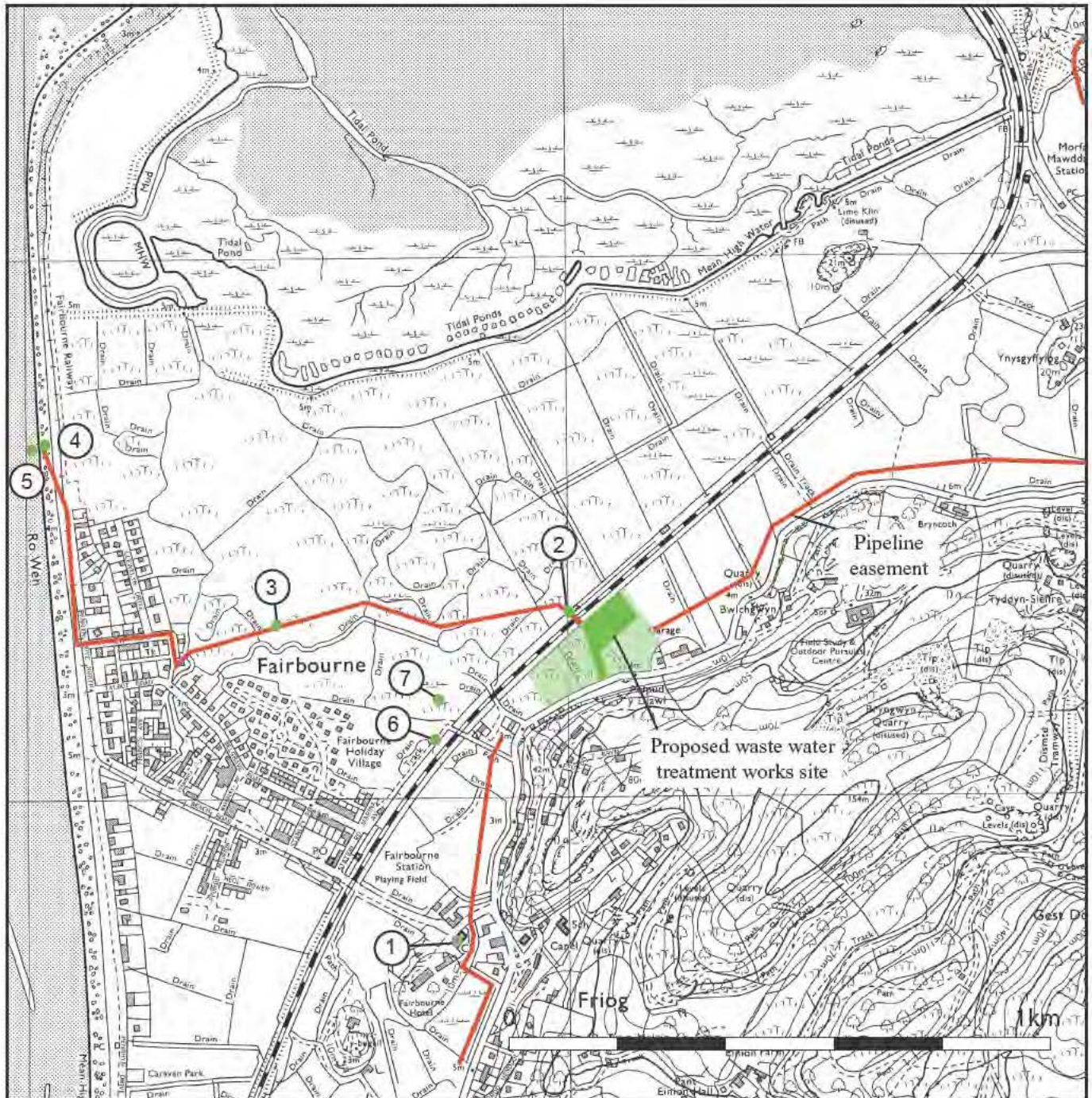
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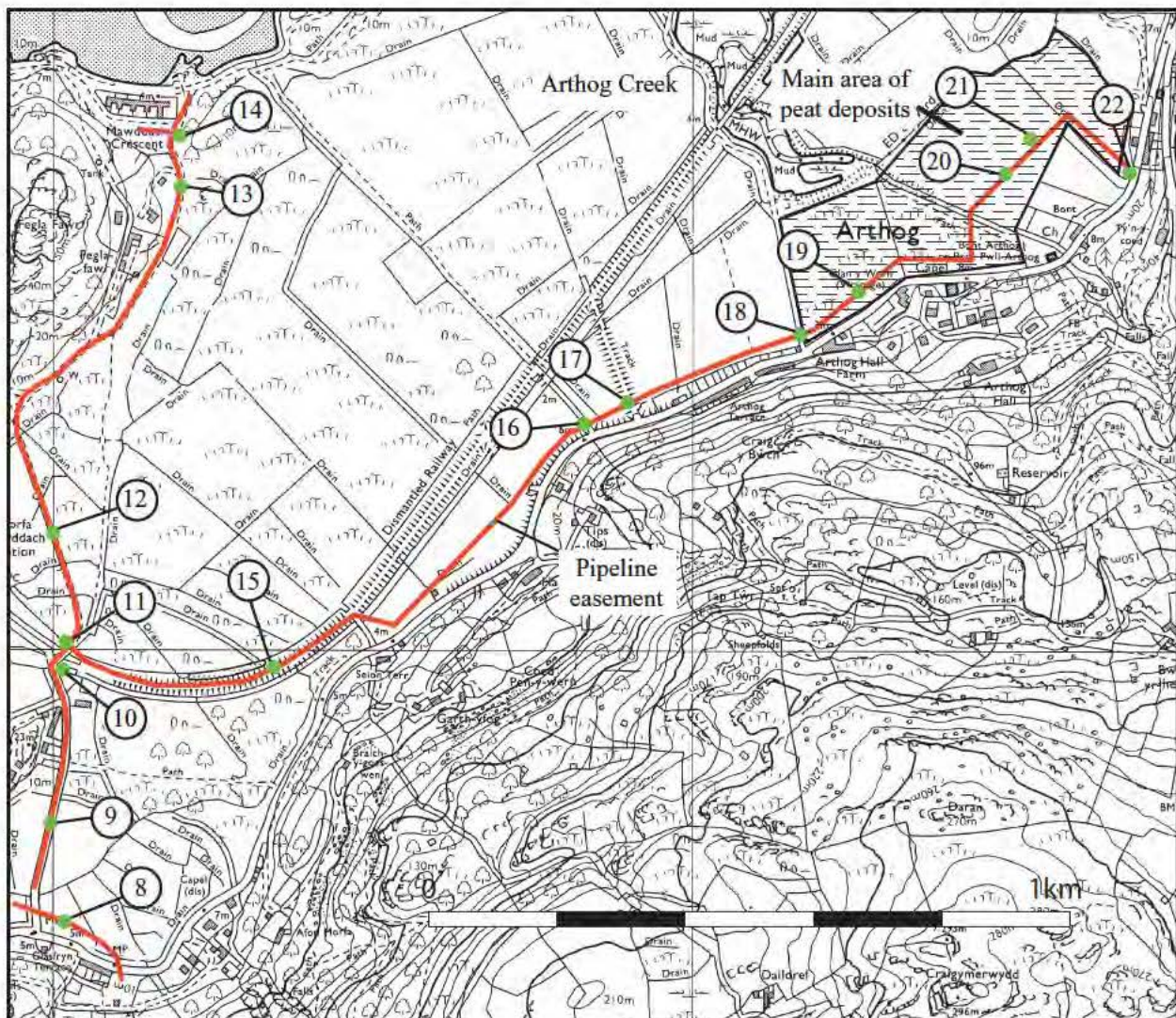
Fairbourne Waste Water Treatment Scheme: Fig. 1 General location of areas A-F covered by archaeological watching brief, August and September 2003
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Fairbourne Waste Water Treatment Scheme:

Fig. 2 Pipeline West and the proposed Treatment Works site: Archaeological features 1-7.

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Fairbourne Waste Water Treatment Scheme:

Fig. 3: Pipeline East, Archaeological features 8-22.

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Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 4 Area A Pipe trench, from the east. 1m scale



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 5 Area B Treatment Works tank construction.
General view, from the south-west



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 6 Area B Treatment Works tank construction.
Ancient tree trunk as first exposed



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 7 Area B Treatment Works tank construction.
Showing clay revealed beneath peat



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 8 Area C Ancient tree from pipe trench
by the Fegla Fawr trackway. 1m scale



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 9 Area E Pipe trench west of the Afon Arthog,
from the east. 1m scale



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 10 Area F Pipe trench east of the Afon Arthog,
from the west. 1m scale



Fairbourne Waste Water Treatment Scheme,
Archaeological Watching Brief:
Fig. 11 Area F Cattle skeleton revealed in pipe trench,
east of the Afon Arthog, from the west. 1m scale



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