

# SEION WASTE WATER TREATMENT WORKS, SEION, GWYNEDD

## Archaeological Evaluation





# Seion Waste Water Treatment Works, Seion, Gwynedd

## Archaeological Evaluation

Project No. G2563

Report No. 1435

Prepared for: Dwr Cymru

July 2018

Written by: Robert Evans, Neil McGuinness, Stuart Reilly & John Roberts

Front Cover Image: General shot of Fields 1, 2 and 3 (taken from Field 2); proposed pipe route 1 (photographic archive ref. G2563\_031)

**Front cover image: General location shots pre-excavation; scale: not used (archive reference: G2558\_003)**

Cyhoeddwyd gan Ymddiriedolaeth Achaolegol Gwynedd  
Ymddiriedolaeth Archaeolegol Gwynedd  
Craig Beuno, Ffordd y Garth,  
Bangor, Gwynedd, LL57 2RT

Published by Gwynedd Archaeological Trust  
Gwynedd Archaeological Trust  
Craig Beuno, Garth Road,  
Bangor, Gwynedd, LL57 2RT

Cadeiryddes/Chair - Yr Athro/Professor Nancy Edwards, B.A., PhD, F.S.A.  
Prif Archaeolegydd/Chief Archaeologist - Andrew Davidson, B.A., M.I.F.A.

Mae Ymddiriedolaeth Archaeolegol Gwynedd yn Gwmni Cyfyngedig (Ref Cof. 1180515) ac yn Elusen (Rhif Cof. 508849)  
Gwynedd Archaeological Trust is both a Limited Company (Reg No. 1180515) and a Charity (reg No. 508849)



<b>Approvals Table</b>				
	<b>Role</b>	<b>Printed Name</b>	<b>Signature</b>	<b>Date</b>
Originated by	Document Author			
Reviewed by	Document Reviewer			
Approved by	Principal Archaeologist			

<b>Revision History</b>			
<b>Rev No.</b>	<b>Summary of Changes</b>	<b>Ref Section</b>	<b>Purpose of Issue</b>
01	Updates to non-technical summary and conclusions/recommendations	4	For GAPS approval

**CONTENTS**

- NON-TECHNICAL SUMMARY ..... 2
- 1 INTRODUCTION ..... 3
  - 1.1 Assessment Aims and Objectives ..... 4
- 2 METHODOLOGY ..... 5
  - 2.1 Assessment (Desktop Study) ..... 5
  - 2.2 Walkover Survey ..... 6
  - 2.3 Gazetteer ..... 6
  - 2.4 Geophysical Survey ..... 7
    - 2.4.1 Technical Detail ..... 7
    - 2.4.2 Instrumentation ..... 7
    - 2.4.3 Data Collection ..... 8
    - 2.4.4 Data Processing ..... 8
- 3 RESULTS ..... 10
  - 3.1 Desk-based Assessment Results ..... 10
    - 3.1.1 Geology ..... 10
    - 3.1.2 Prehistoric and Roman Background ..... 10
    - 3.1.3 Medieval Background ..... 11
    - 3.1.4 Post-medieval Background ..... 11
    - 3.1.5 Lidar and Aerial Photographs ..... 13
  - 3.2 Walkover Survey Results ..... 14
    - 3.2.1 Location of proposed Waste Water Treatment Works and associated infrastructure ..... 14
    - 3.2.2 Proposed routes of the outfall pipe ..... 15
  - 3.3 Gazetteer of features ..... 16
  - 3.4 Geophysical Survey Results ..... 23
    - 3.4.1 Discussion and recommendations ..... 23
- 4 CONCLUSIONS AND RECOMMENDATIONS ..... 24
- 5 SOURCES CONSULTED ..... 25
  - 5.1 Primary Sources ..... 25
  - 5.2 Secondary Sources ..... 26



## Figures

Figure 01: Location of archaeological features (red dots) in relation to development site (red outline). Scale 1:7,000 @ A4. Base map taken from Ordnance Survey 1: 10,000 Series Sheet SH56 NW and NE;

Figure 02: WWTW and access road geophysical survey greyscale-plot;

Figure 03: Tithe Map and Apportionment of the Parish of Llanddeiniolen 1838, with the WWTW and Pipeline Routes overlain (National Archives). Scale 1:6000 @A4;

Figure 04: Plan of Farms in the north of the Parish of Llanddeiniolen, part of the "Surveys of the Vaynol Estate made for the purposes of Valuation", begun by the late Robert Lloyd Ellis and completed by Frederick Jackson (1867), with the WWTW and Pipeline Routes overlain (Gwynedd Archives, X/Vaynol/4138-9). Scale 1:6000 @A4;

Figure 05: Ordnance Survey Caernarfonshire County Series 1st edition 25 inch map of 1889, sheet XI.7, with the WWTW and Pipeline Routes overlain. Scale 1:6000 @A4;

Figure 06: Ordnance Survey Caernarfonshire County Series 2nd edition 25 inch map of 1900, sheet XI.7, with the WWTW and Pipeline Routes overlain. Scale 1:6000 @A4;

Figure 07: Ordnance Survey Caernarfonshire County Series 3rd edition 25 inch map of 1914, sheet XI.7, with the WWTW and Pipeline Routes overlain. Scale 1:6000 @A4;

Figure 08: Reproduction of client drawing w2395-910; the proposed layout of the Waste Water Treatment Works;

Figure 09: Location of Proposed Pipeline Routes, Archaeological Features and Fields of the Desk-based Assessment and Walkover Survey. Scale 1:3,000 @A4. Base map taken from Ordnance Survey 1: 10,000 Series Sheet SH56 NW and NE;

Figure 10: WWTW and access road geophysical survey interpretative plan.



## Plates

Plate 1 - View of field entrance and gateway to adjoining field to the north (archive reference: G2563\_010).

Plate 2 - Proposed WWTW location in northern corner of field (archive reference: G2563\_011).

Plate 3 - View along northern field boundary towards entrance along proposed access road route (archive reference: G2563\_005).

Plate 4 - View along northern field boundary from entrance along route of proposed access road towards treatment plant location (archive reference: G2563\_001).

Plate 5 - View along southern field boundary towards lower western corner of field (archive reference: G2563\_012).

Plate 6 - Close up view of field entrance and clawdd wall field boundary on eastern side of field (archive reference: G2563\_014).

Plate 7 - Wetter ground in northern corner of field (archive reference: G2563\_009).

Plate 8 - General shot of Fields 1, 2 and 3 (taken from Field 2); proposed pipe route 1 (archive reference: G2563\_031).

Plate 9 - View of Field 3, proposed pipe route 2 (archive reference: G2563\_024).

Plate 10 - Manhole cover adjacent to Feature 4, Field 5; scale: 1x1m (archive reference: G2563\_035).

Plate 11 - South field boundary of Field 1, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_020).

Plate 12 - Primary Reference Number: 71209. Field 3 remnants of slate and wire fencing, proposed pipe routes 1 & 2; scale: 1x1m (archive reference: G2563\_022).

Plate 13 - Primary Reference Number: 28870. Well - Feature 2, proposed pipe route 1; scale:

1x1m (archive reference: G2563\_027).

Plate 14 - Primary Reference Number: 28870. Interior of well - Feature 2, Field 2, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_028).

Plate 15 - Primary Reference Number: 71210. Feature 3 - clawdd - Field 2, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_029).

Plate 16 - Primary Reference Number: 71211. Close-up of north face of Feature 4, Field 5; scale: 1x1m (archive reference: G2563\_037).

Plate 17 - Primary Reference Number: 71212. Feature 5, southern field boundary of Field 6; scale: 1x1m (archive reference: G2563\_044).

Plate 18 - Proposed pipe route 2 through Field 6; scale: 1x1m (archive reference: G2563\_048).

Plate 19 - Primary Reference Number: 71213. Exit point for proposed pipe route 1 through Feature 6; scale: 1x1m (archive reference: G2563\_054).

Plate 20 - Primary Reference Number: 71214. Feature 7 (lane); scale: 1x1m (archive reference: G2563\_059).

Plate 21 - Primary Reference Number: 71214. Feature 7, eastern clawdd; scale: 1x1m (archive reference: G2563\_060).

Plate 22 - Primary Reference Number: 71215. Proposed pipe route 1 through Field 10; scale: 1x1m (archive reference: G2563\_066).

Plate 23 - Primary Reference Number: 71216. Proposed pipe route 3 access to Feature 9; scale: 1x1m (archive reference: G2563\_068).

Plate 24 - Primary Reference Number: 71216. Proposed pipe route 3 through Feature 9; scale: 1x1m (archive reference: G2563\_069).

Plate 25 - Primary Reference Number: 71216. Proposed pipe route 3 through Feature 9; scale: 1x1m (archive reference: G2563\_072).

Plate 26 - Primary Reference Number: 71217. Location of Feature 10, set within Feature 9, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_071).

Plate 27 - Primary Reference Number: 71217. Close-up of Feature 10, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_070).

Plate 28 - Primary Reference Number: 71218. Southwest face of Feature 11, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_073).

Plate 29 - Primary Reference Number: 56143. Features 11 & 12 off proposed pipe route 3; scale: 1x1m (archive reference: G2563\_074).

Plate 30 - Primary Reference Number: 56143. Entrance to lean to structure of Feature 12; scale: 1x1m (archive reference: G2563\_077).

Plate 31 - Primary Reference Number: 56143. West face of Feature 12; scale: 1x1m (archive reference: G2563\_078).

Plate 32 - Primary Reference Number: 71219. Exit point from Field 12 (Feature 13), proposed pipe route 3; scale: 1x1m (archive reference: G2563\_084).

Plate 33 - Primary Reference Number: 71219. Feature 13 in Field 12; scale: 1x1m (archive reference: G2563\_085).





## **NON-TECHNICAL SUMMARY**

*Gwynedd Archaeological Trust (GAT) was commissioned by Dwr Cymru to undertake an archaeological assessment of a proposed waste water treatment works and associated infrastructure, including the proposed routes of an outfall pipe at Seion, Gwynedd.*

*The archaeological assessment consisted of a desk-based assessment with an accompanying walkover survey of the whole scheme and a geophysical survey of the proposed location of the waste water treatment works.*

*In total 15 features were identified through the desk-based assessment and walkover survey of the scheme. These are predominantly agricultural in character, dating from the mid to late 19<sup>th</sup> century and are associated with the farms of the former Vaynol Estate. The geophysical survey did not identify archaeological remains but it is recommended that trial trenches are excavated at the proposed location of the waste water treatment works to verify the results and determine the presence/absence of archaeological remains.*

*Once an outfall pipe route has been confirmed, an archaeological watching brief will be undertaken of the associated ground clearance and to record any physical impact on the archaeological features identified in the desk-based assessment and walkover survey.*

# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by *Dwr Cymru* to undertake an archaeological assessment of a proposed waste water treatment works at Seion, Gwynedd (NGR SH54556684; Figure 01). The location for the sewage works is currently a field of pasture located to the south of the village of Seion and to the immediate north of the Ty'n Ross Hotel. The proposed development will replace an existing septic tank with a waste water treatment works that will consist of an inlet channel with storm overflow, storm screen and a fully integral rotating biological contactor (RBC) along with access from the main road (Figure 02). The final effluent outfall from the works will discharge to the Nant y Garth via a newly installed final effluent outfall pipework.

The archaeological assessment was conducted as outlined in the approved GAT Written Scheme of Investigation ([Appendix I](#)) and consisted of the following:

- A desk-based assessment (DBA) that incorporated the area of the proposed waste water treatment works and the potential gravity outfall pipe routes to the Nant y Garth (Figure 03);
- A site walkover that encompassed the location of the proposed waste water treatment works and the three proposed routes of the outfall pipe to supplement the DBA; and
- A geophysical survey was conducted at the location of the proposed waste water treatment works.

The project has been monitored by the Gwynedd Archaeological Planning Service (GAPS). *The content of this report by GAT must be approved by GAPS prior to final issue.*

The archaeological assessment was completed in accordance with the following guidance:

- *Standard and Guidance for Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for Archaeological Field Assessment* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for Geophysical Survey* (Chartered Institute for Archaeologists, 2014);

- *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (Chartered Institute for Archaeologists, 2014);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015);
- *Historic Environment Record (HER) Guidelines for Archaeological Contractors* (Version 1.3; draft) (Gwynedd Archaeological Trust, 2014); and
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

## **1.1 Assessment Aims and Objectives**

The key aims and objectives were to:

- establish the extent to which archaeological remains survive at the location of the proposed waste water treatment works and within the immediate vicinity;
- establish the date and nature of archaeological remains within the scheme and assess their implications for understanding the historical development of the area;
- if previously unknown archaeological features are identified through the DBA and the accompanying walkover survey then they will need to be mitigated for, through altering the route of the pipeline or amending the layout of the treatment works, for example; and
- if previously unknown archaeological features are identified through the geophysical survey then they will need to be evaluated with trial trenches to confirm the results. If the trenches confirm the presence of archaeology this may require preservation by record, i.e. further investigation, or preservation in-situ that may require altering the route of the pipeline or amending the layout of the treatment works.



## **2 METHODOLOGY**

### **2.1 Assessment (Desktop Study)**

A desk-based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate” (ClfA 2014, 4).

The desk-based assessment involved a study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) has been examined for information concerning the study area, defined as the proposed location of the waste water treatment works and three proposed routes for the outfall pipe (Figure 01). The search included an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the HER. All identified features have been mapped, described and added to a gazetteer of sites and the relative importance of sites have been defined;
2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) has been checked for sites additional to the HER;
3. Aerial photographs from the Historic Environment Register ((HER) Gwynedd Archaeological Trust have been examined for potential features;
4. On-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU);
5. Archive data, including primary and secondary sources, historic maps and estate maps have been examined at the regional archives (Gwasanaeth Archifau Gwynedd, Cyngor Gwynedd, Caernarfon LL55 1SH and Meirionnydd Record Office, Bala Rd, Dolgellau LL40 2YF);

6. Light Detection and Ranging (LiDAR) data has been examined from the Lle Geo-Portal at <http://lle.gov.wales/home> for information on potential surface features using digital terrain modelling and digital surface modelling.

## 2.2 Walkover Survey

A walkover survey was conducted at the proposed location of the waste water treatment works and the three proposed routes of the outfall pipe to supplement the DBA. The walkover survey was undertaken to identify any new archaeological features on the ground and accurately map and describe them on GAT pro-formas. The sites have been added to a gazetteer and their relative importance defined. The potential for sub-surface archaeology has been estimated and defined.

The walkover surveys were documented using GAT pro-formas. Photographic images were taken using a digital SLR (Nikon D31000) camera set to maximum resolution (4608 x 3072; 14.1 effective megapixels) in RAW format and were converted to TIFF for archiving in accordance with *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015). A total of 97 images were taken (archive reference: G2563\_001 to G2563\_097; cf. [Appendix II](#)).

## 2.3 Gazetteer

A gazetteer has been compiled for any identified sites within and within proximity to the specified route based on information sourced from the regional HER; the gazetteer will include:

1. Feature Number
2. Site name
3. PRN number
4. Grid reference
5. Period
6. Site type
7. Assessment category
8. Description
9. Impact
10. Recommendation for further assessment/assessment
11. Recommendation for mitigatory measures

## **2.4 Geophysical Survey**

### *2.4.1 Technical Detail*

The survey was carried out in a series of traverses within 8x20m grids covering the footprint of the proposed WWTW and access road. The grids were tied into the Ordnance Survey grid using a Trimble high precision GPS system. The survey was conducted using a Bartington Grad 601-2 dual fluxgate gradiometer. The surveys were carried out at standard resolution with a 1.0m traverse interval and 0.25m sample interval.

### *2.4.2 Instrumentation*

The Bartington Grad 601-2 dual fluxgate gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies. The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites. Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features. The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 500mm apart. Their mu-metal cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output. The gradiometer can detect anomalies down to a depth of approximately one meter. The magnetic variations are

measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT; typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The machine is capable of detecting changes as low as 0.1nT.

### *2.4.3 Data Collection*

The gradiometer includes an on-board data-logger. Readings are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 1.0 m. Readings are logged at intervals of 0.25m along each traverse. Marked guide ropes are used to ensure high positional accuracy during the survey. The data is transferred from the data-logger to a computer where it is compiled and processed using TerraSurveyor3 software. The data is presented as a grey-scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main feature of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most susceptible to misinterpretation due to the propensity of the human brain to define shapes and patterns in random background "noise". An assessment of the confidence of the interpretation is given in the text.

### *2.4.4 Data Processing*

The data is presented with a minimum of processing although corrections may be made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc. are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some 'noisy' or very complex sites can benefit from 'smoothing'. Grey-scale plots are always somewhat pixellated due to the resolution of the survey. This at times makes it difficult to see less obvious anomalies (Figure 02). The readings in the plots can therefore be interpolated thus producing more but smaller pixels

and a small amount of smoothing based on a low pass filter can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

## **3 RESULTS**

### **3.1 Desk-based Assessment Results**

#### *3.1.1 Geology*

The underlying bedrock geology in the vicinity of the location of the waste water treatment works primarily consists of ash-flow tuff of the Padarn Tuff Formation (BGS 1985). This is Igneous Bedrock formed approximately 541 to 635 million years ago in the Ediacaran Period. In addition, there are veins of an Unnamed Igneous Intrusion, Ordovician Microgabbro, within the Padarn Tuff Formation. This Igneous Bedrock formed approximately 444 to 485 million years ago in the Ordovician Period (Smith and George 1961). To the south-east of the study area sandstone and conglomerate of the Minffordd Formation are noted (BGS 1985).

Soils in the study area consist of Typical Brown Earths of the Wick 1 Association, with some areas of Cambic Stagnogley soils of the Brickfield 2 Association on the lower ground (Soil Survey of England and Wales- Sheet 2, 1980).

#### *3.1.2 Prehistoric and Roman Background*

There are no known prehistoric or Roman archaeological features recorded by the Historic Environment Record (HER) within the proposed location of the waste water treatment works but there are known features within close proximity of the proposed outfall pipeline routes, which are shown on Figure 01. There is also significant prehistoric and Roman archaeological activity within the wider area. Of likely Bronze Age date is a burnt mound to the south of Ty Mawr which is adjacent to a small stream (PRN 15; NGR SH55186619). The mound is approximately 1m in height with a diameter of approximately 18m but the southern half has been destroyed by a modern ditch.

There are two settlement enclosures approximately 500m to the east of the site, the settlement enclosure of Ty Mawr (PRN 11; NGR SH 55256678) and the nearby Ty Mawr enclosure (PRN 8; 55116662). The former is an oval enclosure, that measures c.50m northwest - southeast by 37m northeast – southwest, defined by a degraded stone filled bank. Within this enclosure there are two hut circles set against the south circuit of the bank. The latter is a sub - circular enclosure, approximately 26m in diameter and is also defined by a stone filled bank, with a possible hut circle at the centre. These settlements are most likely Iron Age (700 BC to 74 AD) or Romano-British (74 to 410 AD) in date (RCAHMW 1960, 180-181).

Located between these settlements and the site, to the southeast of Seion, are parch marks that may represent remnants of Fachell Roman road (PRN 17566) part of the route from Caerhun to Caernarfon. In addition, there is another possible Roman road that extends north east between the farms Ty'n-yr-allt and Tan-yr-wylfa that formed part of the route between Segontium and Bangor (PRN 17829).

### *3.1.3 Medieval Background*

The study area lies within the Parish of Llanddeiniolen, within the former Cantref of Arfon. There is little known of medieval settlement within the study area. The church of Llanddeiniolen, which has medieval origins, although the current church is a Victorian rebuild south-west of the former church lies 930m south of the proposed WWTW (PRN6951; LB II 14927; NGR54576592). The exception to this is to the south east of Ty Mawr farm where there is a medieval moated site (PRN 6; NGR SH55556643), which is a Scheduled Monument (CN156) that consists of a rectangular earthwork set in a marshy valley bottom. It is comprised of two shallow ditches with a low central bank and there are possible traces of a rectangular building within the interior which measures 42m by 34m. There is an apparent entrance on the north west side, with a 4.5m wide stone causeway cutting through the two ditches. It is likely that the origins of the post-medieval settlement pattern of farmsteads was starting to develop in the late medieval period.

### *3.1.4 Post-medieval Background*

The pipe routes extend through the Arfon plateau (PRN 15849), an area made up of improved pasture, which was formerly Vaynol estate land. The origins of the parcelling out of the Vaynol estate farms of Rhos yr Hwylfa, Tynyrallt and Tan yr Hwylfa are unknown. This is due to the fact that they formed part of the core of the Vaynol estate from its earliest times. The farm of Rhose [Rhos yr Hwylfa] is noted on the earliest estate document to survive, an estate rental of the year 1696, when Robert Owen pays 14 shillings in rent per annum, and Humphrey Thomas pays £4 for Tan yr Hwylfa, with Ellis Morris paying £6 rent for Pen yr Hwylfa [this farm later became known as Tynyrallt] (X/Vaynol/3744). All three farms appear in subsequent surviving rentals, and in 1844 Tan yr Hwylfa is occupied by Ellis Williams, paying £23 in rent, Rhos yr Hwylfa is divided into many smaller parcels, and Tynyrallt is occupied by William Jones paying £17 15s in rent (X/Vaynol/3838). The farms are recorded in the 1832 Vaynol estate survey, although with little detail added (X/Vaynol/406) (it should be noted that this volume is a large folio book which cannot be copied). The tithe map and apportionment of 1838 shows only the main property boundaries (Figure 03), but the apportionment details for the route and adjacent properties are given in the table below:

Landowners	Occupiers	Numbers referring to the plan	Name and Description of Lands and Premises	Quantities in Statute Measure A R P
Smith, Thomas Assheton Esquire	Davies, John and Humphrey	2	Ty'n y Coed	86 2 24
	Williams, Ellis	3	Tan yr Hwylfa	110 3 10
	Jones, William	4	Ty'n yr Allt alias Pen yr Hwylfa	2 1 33
	Williams, Jane	5	Bryn yr Hwylfa	10 1 12
	Jones, Hugh Jeffries	11	Rhos yr Hwylfa	40 - 20
	Owen, Owen Jeffries	9	Cottages and Land on Rhos yr Hwylfa	9 2 29

A large scale and detailed estate survey and valuation was carried out by Vaynol in 1867, which included a lot of detail concerning the properties along the pipeline route. The area is one of a patchwork of irregular older fields and farmsteads to the north-west, and post enclosure regular parcels in the former *rhos* area to the east, land which had clearly been improved. This is shown on Figure 04 with the WWTW and the possible pipeline routes overlain upon it (X/Vaynol/4138). The different occupancies are shown in several colours, and the fields, boundaries and woodland are shown in detail. Tan yr Hwylfa is described as being 'so infected with rabbits' that they needed to be destroyed before 'any value could be realised' (X/Vaynol/4089).

There are several post-medieval structures and outbuildings indicative of the wider rural setting of the Seion area (Figure 01), that are located within approximately 500m of the proposed site (PRN 28866 – 28868 and 56142). These include the Seion Wesleyan Methodist Chapel (NPRN 6951; NGR SH54716693) which was built in 1818 and repeatedly modified throughout the 19<sup>th</sup> century. The chapel is built in the Classical style with a gable entry plan. Documents relating to the life of the chapel are preserved in Gwynedd Archives (XD34/18-19, 599-602). There are also two quarries (PRN 28864 & 28865; NGR SH5486 and 54756629) along with a small rectangular structure (PRN 28866; NGR SH54766630) c.500m to the southeast of the site, along the B4366. These are of unknown, but likely to be post-medieval date. A number of structures within the study area are noted on the Gwynedd HER, including a well (PRN 28870; NGR SH54626696) that is positioned adjacent to a field



boundary that demarcates the start of *Route One*; and a building to the north west of the farm Tan-yr-wylfa (PRN 56143; NGR SH54296732) which is in close proximity to the terminal of *Route Three*.

The 1st edition 25 inch Ordnance Survey map of 1889 (Figure 05) shows that the landscape of the area has changed in only a minor way from that shown in 1867. There was some amalgamation of the fields belonging to Tynrallt, although this was limited. No discernible changes were noted on the 2nd edition map of 1900 or the 3rd edition map of 1914 (Figures 06 and 07).

By 1925 the farm land holdings in the area had been rationalised into three larger holdings; Fachell, tenanted by Thomas Parry and paying £16 10s for a half years rent, Tynrallt, tenanted by T.G. Hughes and paying £2 11s, and Tyn y Coed, tenanted by the representatives of Owen B. Thomas paying £24 3s (X/Vaynol/3960). This indicates that the rationalisation, presumably to increase profits, took place between 1867 and 1925. In 1967 these properties, incorporating the entire study area, were sold in the major Vaynol estate sale of 28<sup>th</sup> July 1967, when the estate was substantially broken up and the farms sold into private hands (XSC/807). 'Tynrallt' farm is described at this time as having 37 acres of permanent pasture, 10½ acres of arable, 7½ of rough pasture, and 18 of rough grazing.

### 3.1.5 Lidar and Aerial Photographs

Lidar coverage was noted to extend over a small area at the north-western end of the proposed pipeline routes, in the form of Digital Terrain Modelling at 2m and 1m intervals (DTM), seen at <http://lle.gov.wales/Catalogue/Item/LidarCompositeDataset/?lang=en>. This showed the topography and terrain of the area clearly for this small area, but no additional archaeological information was encountered.

ADAS Aerial Photography Unit, Cambridge Film 452 Frame 236 taken on 2<sup>nd</sup> May 1990 shows the study area clearly (it has not been reproduced due to copyright restrictions). No clear additional archaeological information could be obtained, and the topography and field patterns remained similar to that shown on the map evidence. There was however much evidence for the insertion of modern drainage and other recent ground disturbance. Possible evidence of paleo-channels was also observed. Although not located within the study area, within a field southwest of the western end of the proposed pipelines and area of irregular and regular criss-crossed parch mark features was noted (location noted on Figure 01). These are likely to be a mixture of palaeo-channels and drainage, but may represent archaeological activity.

## **3.2 Walkover Survey Results**

### *3.2.1 Location of proposed Waste Water Treatment Works and associated infrastructure*

A walkover survey of the field in which the proposed waste water treatment works and access road is located was conducted in dry sunny conditions on Thursday 28<sup>th</sup> June 2018. The location of the field, together the extent of footprint of the proposed works within it, is shown on Figures 01 and 08.

The proposed works are located on the north and eastern side of a sub rectangular shaped field of improved pasture grassland (Plates 1 & 2). The field is 0.83 ha in area and bounded by minor roads to the east and south, and further agricultural fields to the north and west. It is enclosed by grown out post-medieval stone faced hedge banks, cloddiau, on all sides, with modern wooden post and wire fences set on, or inside of the cloddiau (Plates 3 & 4). Some semi mature trees have colonised the northwest-southeast aligned clawdd that forms the southern boundary (Plate 5). A wooden gate in the eastern corner of the field provides access from the road side (Plate 6), whilst access to the field to the north is via an adjacent gateway with a galvanised steel gate set at the eastern end of the northwest-southeast aligned northern boundary. A set of overhead power lines extends northeast-southwest above the eastern boundary, while a second extends approximately parallel to the first within the field, approximately 20m from the eastern boundary.

The highest point of the field, at approximately 132m AOD, is on its northern side, around 20m from the entrance gate. From here the ground gently falls away to the west and south, with the ground becoming progressively less well drained as the ground falls towards the lower northern and southern corners which lie at approximately 126.5m AOD. The ground across the whole field was dry at the time of the site visit which was conducted following an extended period of very hot dry weather.

The presence of patches of rushes (juncus) (Plate 7) in both the lower northern and southern corners suggests that under typical rainfall conditions, both of these areas are normally wetter than the rest of the field. This may be particularly significant in the northern corner as this lies within the footprint of the proposed waste water treatment works and it may be that the potential for survival of peat deposits or organic material in any as yet unknown archaeological features here is increased.

With the exception of the post medieval cloddiau, no visible evidence for either upstanding or buried archaeological features was noted within the field.

### 3.2.2 Proposed routes of the outfall pipe

The walkover survey for the three proposed routes of the outfall pipe was conducted on Tuesday 3<sup>rd</sup> July 2018. The routes surveyed were based on the information supplied from *Dwr Cymru* and the client drawing *w2395-0001*. The day of the survey was dry, sunny and hot, with a stiff westerly breeze. The fields through which the proposed routes pass are predominantly used for pasture (Plate 8), some of which, in particular those to the west and south west of Tan-yr-wylfa are of rough grazing being located within marginal and wet ground, as denoted by frequent thick concentrations of beds of rushes. This was also notable within some of the fields adjacent to Seion, for example, Field 3 along the eastern, north eastern and northern edges of the field (Figure 09 & Plate 9). Sections of the walkover survey route, Fields 16 and 17 are heavily forested and inaccessible. While other fields, such as 14 and 15 have been cleared by the farm Ty'r-yr-allt for access or as an extension to the farmyard, respectively. In addition, Fields 10 and 11 were inaccessible due to a combination of high fences, no access gates and deep drainage ditches around the boundaries, in particular the northern edge of Field 11. Although it was possible to visually inspect Field 11 from the adjacent lane and Field 10 from Field 9.

The area through which the pipe routes pass is undulating, with the local high point concentrated around the farm Ty'r-yr-allt and the house Bryn Clychau'r Gog and the ground slopes quite dramatically to the north of these properties. While the majority of the routes pass through fields of pasture, sections of *Route Three* extend along lanes that are public rights of way and the garden of Tan-yr-wylfa (Figure 09). It was noted during the walkover survey parallel with the southern field boundaries of Fields 1, 2 and 5 that there were several manhole covers (Plate 10). This would indicate the presence of an existing pipe.

### 3.3 Gazetteer of features

The sites identified in the DBA and on the walkover survey are listed below, and shown on Figure 09. Any recommendations given are based on the current understanding of the scheme route and methodology. Any amendments to this may result in a requirement to amend the recommendations. A 'C' after the grid reference indicates the central point of a larger or linear feature. In total 13 features were identified during the walkover survey and are outlined below.

#### **Feature 01 (PRN 71209; Plates 11 & 12)**

**Site Name:** Wire and slate fencing to form a path

**Grid Reference:** SH5464966962 C

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is the remnants of wire and slate fencing that appears to define a path aligned east-west. It extends along the northern boundary of Field 3. The slates are machine cut, set vertically into the ground and held in place by thick, rusted iron wire. The path enclosed by the fencing is 1.20m wide, with an average height of 0.70m for the slates. It has an approximate length of 55m, before disappearing into thick undergrowth at the east corner of Field 3 and has been truncated by a more recent wire and post fence in the southwest corner of Field 1. *Routes One* and *Two* will most likely have a negative impact on sections of this feature. Feature 01 is probably depicted on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoidance or have an archaeologist present to record the breach.

#### **Feature 02 (PRN 28,870; Plates 13 & 14)**

**Site Name:** Well

**Grid Reference:** SH5461866981

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is the location of the well identified in the DBA, at the south east corner of Field 2, close to the new post and wire fence that separates it from Field 1. The well is defined and enclosed by sheets of corrugated metal, held in place by wooden fence posts. There is no indication of upstanding remains within the area enclosed but it is an area of soft

ground with a concentration of rushes. The enclosed area measures 3.70m north – south by 2.0m east – west. The well is located along *Route One* which at this point is tight to the southern edge of Field 2.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoidance

### **Feature 03 (PRN 71210; Plate 15)**

**Site Name:** Clawdd

**Grid Reference:** SH5460866982

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** The remnants of a moss covered clawdd, with exposed sections of compacted earth, that extends west northwest by east southeast for an approximate distance of 92.0m, with a surviving width of 2.50m and height of 1.0m. The clawdd has quite a domed profile. It defines the southern edge of Fields 2 and 5, separating them from Field 4. It is of some age as there are two mature oak trees growing out of the bank. Pipe *Route One* appears to extend parallel with Feature 03 and would at least have a temporary visual impact on the feature. Feature 03 is shown on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoidance

### **Feature 04 (PRN 71211; Plate 16)**

**Site Name:** Clawdd

**Grid Reference:** SH5450567021

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is a stone faced clawdd that forms the sinuous western boundary of Field 5 and a small section of the northwest boundary of Field 4. There are substantial remains with a maximum surviving height of 1.0m and width of 2.30m. Due to the presence of dense undergrowth it was hard to determine the relationship between this and Feature 03 but it is highly likely that they are broadly contemporary and abut one another. Like Feature 03 there is a mature oak tree growing out of the clawdd. This field boundary will be breached by *Route One*. Feature 04 is depicted on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoidance

**Feature 05 (PRN 71212; Plates 17 & 18)**

**Site Name:** Drystone wall

**Grid Reference:** SH5441367067

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is a drystone wall that forms the southern boundary of Field 6 that is heavily overgrown in the southeast corner of the field, thus making it next to impossible to determine its relationship with Feature 04. In the northwest corner of Field 6 it has been recently cleared of vegetation with new post and wire fences set on top of a largely collapsed wall and new breaches for the insertion of aluminium gates. The wall has a length of 140m, with a maximum surviving height of 1.45m and width of 1.0m. The southeast corner of Feature 05 may be breached by pipe *Route Two* but otherwise should not be affected by the outflow pipe. Feature 05 is shown on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or have an archaeologist present to record the breach.

**Feature 06 (PRN 71213; Plate 19)**

**Site Name:** Clawdd

**Grid Reference:** SH5448667201

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is the heavily truncated remains of a clawdd associated with a recently cleared drainage ditch that forms the northern boundary of Field 6. The clawdd survives to a height of 1.20m, width of 1.40m, with a length of 50.0m. The ditch had a width of 2.20m and depth of 0.40m. The clawdd is covered in moss and rushes interspersed by the occasional mature thorn or oak tree. It has been surmounted by a modern post and wire fence. A section of Feature 06 will be breached by pipe *Route One*. Feature 06 is depicted on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or have an archaeologist present to record the breach.

**Feature 07 (PRN 71214; Plates 20 & 21)**

**Site Name:** Lane

**Grid Reference:** SH5443767248 (\* Break for *Route One*)

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is a farm lane that extends north from the house Bryn Clychau'r Gog and is flanked by stone faced cloddiau. The eastern clawdd is like a revetment wall as the path cuts through a steep west facing slope. The lane has an interior width of 4.30m, while the eastern clawdd has a height of 1.30m and width of 1.20m. It will potentially be breached by pipe *Route One* at its southern limit close to the house or by *Route Three* at the intersection between Fields 7 and 8. Feature 07 is shown on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or have an archaeologist present to record the breach.

**Feature 08 (PRN 71215; Plate 22)**

**Site Name:** Drystone wall

**Grid Reference:** SH5430167252 (\* Break for *Route One*)

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is the remnants of a drystone wall that forms the north edge of Field 10. It is orientated west northwest by east southeast, with a length of 60.0m, width of 0.50m and height of 1.0m. The wall is made up of large rounded and sub-rounded field clearance boulders. The eastern terminal of the wall may well be clipped by pipe *Route One*. Feature 08 is depicted on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or have an archaeologist present to record the breach.

**Feature 09 (PRN 71216; Plates 23, 24 & 25)**

**Site Name:** Lane

**Grid Reference:** SH5443667311 (\* Taken at interface with Feature 07)

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is a lane and public right of way that extends west from Feature 07, along the northern edge of Field 08 and terminates within the garden of Tan-yr-wylfa. The lane has an estimated length of 170m and maximum width of 5.0m. The eastern half of the lane appears to have been widened, as noted by clearance of vegetation, a new post and wire fence along the northern boundary and the now redundant gate at the eastern terminal with Feature 07. The lane incorporates Feature 10 and bordered by Feature 11 in the western section. Pipe *Route Three* will extend along the full length of the lane. Feature 09 is shown on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Watching brief along lane if pipe *Route Three* is the chosen outflow route.

### **Feature 10 (PRN 71217; Plates 26 & 27)**

**Site Name:** Bridge

**Grid Reference:** SH5436767337

**Period:** Post-Medieval

**Category:** C

**Impact:** Likely

**Description:** This is a small footbridge set within Feature 09 to allow safe crossings of a small stream that crosses the lane. The bridge measures 1.50m in length by 0.85m in width. It consists of two large slabs of slate, supported and held in place by smaller stones. The feature could be negatively affected by pipe *Route Three*. Feature 10 is depicted on the Vaynol estate map of 1867.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or lift and reinstate under archaeological supervision.

### **Feature 11 (PRN 71218; Plates 28 & 29)**

**Site Name:** Drystone wall

**Grid Reference:** SH5432067317 (at centre of wall)

**Period:** Post-Medieval

**Category:** C

**Impact:** None

**Description:** A substantial uncoursed drystone wall that is comprised of sub-angular and angular stones, covered in moss. It is a field boundary wall that forms the northern edge of Feature 09 at the western section of the lane. It abuts the outbuilding Feature 12. Feature 11 is shown on the Vaynol estate map of 1867.



**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None.

**Feature 12 (PRN 56143; Plates 30 & 31)**

**Site Name:** Outbuilding

**Grid Reference:** SH5429367320

**Period:** Post-Medieval

**Category:** C

**Impact:** None

**Description:** This is a semi-derelict stone and mortar outbuilding, most likely associated with the nearby Tan-yr-wylfa farm. The outbuilding is present on the 1867 Vaynol estate map and the ordnance survey maps thereafter, which would suggest that it originates at least from the mid to late 19<sup>th</sup> century. It is a structure with double pitched slate roof, with two entrances at the west face of the building. It was not possible to access the outbuilding as the entrances were blocked with discarded rubbish and blocks of timber. At the south face there is a small lean-to structure with a narrow brick and mortar wall and dilapidated wooden half door. Pipe *Route Three* will pass the western face of the outbuilding but it should not have a physical impact on the building.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None.

**Feature 13 (PRN 71219; Plates 32 & 33)**

**Site Name:** Clawdd

**Grid Reference:** SH5424267331 (\* Break for *Route Three*)

**Period:** Post-Medieval

**Category:** C

**Impact:** None

**Description:** This is a clawdd that defined the boundary between Fields 12 and 13. It is orientated north-south, with a surviving height of 1.30m and width of 1.20m. The boundary comprises of a mix of up cast earth mixed with frequent medium sized sub-rounded and sub-angular stone along with the occasional large sub-angular boulder. Several thorn and ash trees grow out of the clawdd. Feature 13 is visible on the Vaynol estate map of 1867. Pipe *Route Three* will pass through Feature 13.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** Avoid or have an archaeologist present to record the breach.

**Feature 14 (PRN 71220; Plates 01 - 07)****Site Name:** Cloddiau**Grid Reference:** SH5460666827 (Centre of northern boundary)**Period:** Post-Medieval**Category:** C**Impact:** None

**Description:** The cloddiau define the boundaries of the field for the proposed location of the waste water treatment works. It is currently a field of pasture located to the immediate north of the Ty'n n Rhos hotel and to the southwest of the village of Seion. The cloddiau are stone faced with modern wire and post fences set on top or within them as well as trees and bushes. On average the cloddiau have a height of 1.0m and width of 2.50m. Aside from widening the access to the field the cloddiau should not be affected by the groundworks associated with the waste water treatment works.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** An archaeologist to be present to record the breach at the current access point.

**Feature 15 (PRN 71221)****Site Name:** Palaeo-channels and/or drainage**Grid Reference:** SH5409867178 (centre of patch marks)**Period:** Unknown**Category:** C**Impact:** None

**Description:** Located in a field of rough pasture to the southwest of the terminal point of the three proposed outfall pipe routes. A series of irregular and regular criss-crossed patch mark features were identified on ADAS Aerial Photography Unit, Cambridge Film 452 Frame 236 taken on 2<sup>nd</sup> May 1990 in the field in question. The patch marks are predominantly to the west of a field boundary and south of Nant Cefn. They may represent a series of palaeo-channels and/or drainage. This field is not part of the Seion WWTW scheme and as such should not be physically impacted upon by the subsequent groundworks.

**Recommendations for further assessment:** None

**Recommendations for mitigatory measures:** None

### **3.4 Geophysical Survey Results**

No likely archaeological anomalies were identified within the survey area.

A southwest-northeast aligned irregular linear positive anomaly with a strong negative response (1) most likely represents magnetic variation from a geological source as does a smaller irregular linear anomaly (2). The northern corner of the field (3) is noticeably less magnetically noisy than the ground to the south and east, possibly as a result of a greater depth of peaty organic soil in this lower, wetter corner of the field (see Figure 10 & Section 3.2.1).

A number of dipolar responses across the survey area are a result of ferrous metal debris in the topsoil.

The northern and eastern edges of the survey area showed high amplitude disturbance from modern ferrous metal objects in the form of the post and wire fencing along the northern edge of the field and gates, fencing and a feeding trough at the east. Disturbance from such sources can mask weaker archaeological anomalies however the area affected does not represent a significant proportion of the survey.

#### *3.4.1 Discussion and recommendations*

The geophysical survey results identified no likely archaeological anomalies, the identified anomalies most likely all represent magnetic variations from geological sources. The results do not preclude the possibility of archaeological activity being present at the site however, and it is recommended that a sample of both the seemingly archaeologically blank areas and the geological anomalies are tested by trial trenching to conclusively establish the presence or absence of archaeological features not identified during the survey.

## 4 CONCLUSIONS AND RECOMMENDATIONS

Gwynedd Archaeological Trust (GAT) was commissioned by *Dwr Cymru* to undertake an archaeological assessment of a proposed waste water treatment works and associated infrastructure, including the proposed routes of an outfall pipe at Seion, Gwynedd.

The desk-based assessment identified two known archaeological features within the proposed routes of the outfall pipe, the well (Feature 02/PRN 28,870) located along the southern field boundary of Field 2 and the outbuilding associated with Tan-yr-wylfa (Feature 12/PRN 56,143). There are none present within the field for the proposed location of the waste water treatment works.

The desk-based assessment and walkover survey confirmed the presence of field boundaries, lanes and an outbuilding associated with farms and fields associated with the former Vaynol Estate. These features would be of at least mid to late 19<sup>th</sup> century date and are sites of local importance given their relation to the Vaynol Estate.

The magnetometer survey of the field for the proposed location of the waste water treatment works did not identify likely archaeological anomalies.

Based on the results of the archaeological assessment of the proposed location of the waste water treatment works and routes of the associated outflow pipe, it is recommended that:

- An archaeological watching brief is conducted of the ground clearance of the proposed location of the waste water treatment works and associated infrastructure;
- An archaeological watching brief is undertaken of the confirmed route of the outflow pipe; and
- If any of the archaeological features identified during the desk-based assessment and walkover survey are to be breached or altered by the easement then these will need to be archaeologically recorded pre-breach and after the breach so information can be gained on construction and any phasing.

If the easement for the outflow pipe is large, i.e. it encompasses entire fields or a significant portion thereof, the recommendation for a watching brief may have to be replaced by a magnetometer survey and trial trenches along the confirmed route of the outflow pipe in advance of the proposed groundworks.

## 5 SOURCES CONSULTED

### 5.1 Primary Sources

#### Gwynedd Archives, Caernarfon

*Vaynol Estate papers;*

*X/Vaynol/3744 1696 Estate Rental of Sir William Williams of Vaynol;*

*X/Vaynol/3838 1844 Michaelmas Rental;*

*X/Vaynol/3838 1925 Rental;*

*X/Vaynol/4067 1832 Estate Survey [Large Volume];*

*X/Vaynol/4089 Particulars for Valuation of Lands in the Northern part of the Parish of Llanddeiniolen the Property of the Trustees of George William Duff Assheton Smith 1867;*

*X/Vaynol/4138-9 1867 Plan of Farms in the north of the Parish of Llanddeiniolen, part of the "Surveys of the Vaynol Estate made for the purposes of Valuation, begun by the late Robert Lloyd Ellis and completed by Frederick Jackson;*

#### *Other*

XSC 807 Sale Catalogue of Portions of the Vaynol Estate, sold on 28<sup>th</sup> July 1967.

#### National Archives, Kew

Tithe Map and Apportionment of the Parish of Llanddeiniolen, 1838.

#### Aerial Photograph

ADAS Aerial Photography Unit, Cambridge Film No. 452, Frame No. 236 taken on 2<sup>nd</sup> May 1990.

## 5.2 Secondary Sources

1. British Geological Survey 1985 *England and Wales Sheet 106 Solid Edition*;
2. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Desk-based Assessment*;
3. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Geophysical Survey*;
4. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Archaeological Field Assessment*;
5. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*;
6. English Heritage, 2011, *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation*;
7. Gwynedd Archaeological Trust, 2014, *Historic Environment Record (HER) Guidelines for Archaeological Contractors (Version 1.3; draft)*;
8. Gwynedd Historic Environment Record;
9. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*;
10. Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheet XI.7, 1889;
11. Ordnance Survey Second Edition 1-inch to 25-mile County Series Map Sheet XI.7, 1900;
12. Ordnance Survey Third Edition 1-inch to 25-mile County Series Map Sheet XI.7, 1914;
13. RCAHMW 1960 *An Inventory of the Ancient Monuments in Caernarfonshire. Volume II: Central. The Cantref of Arfon and the Commote of Eifionydd*;
14. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*;
15. Smith, B. and George T.N. 1961 *British Regional Geology-North Wales* (London);
16. Soil Survey of England and Wales 1980 *Sheet 2 Soils of Wales*.

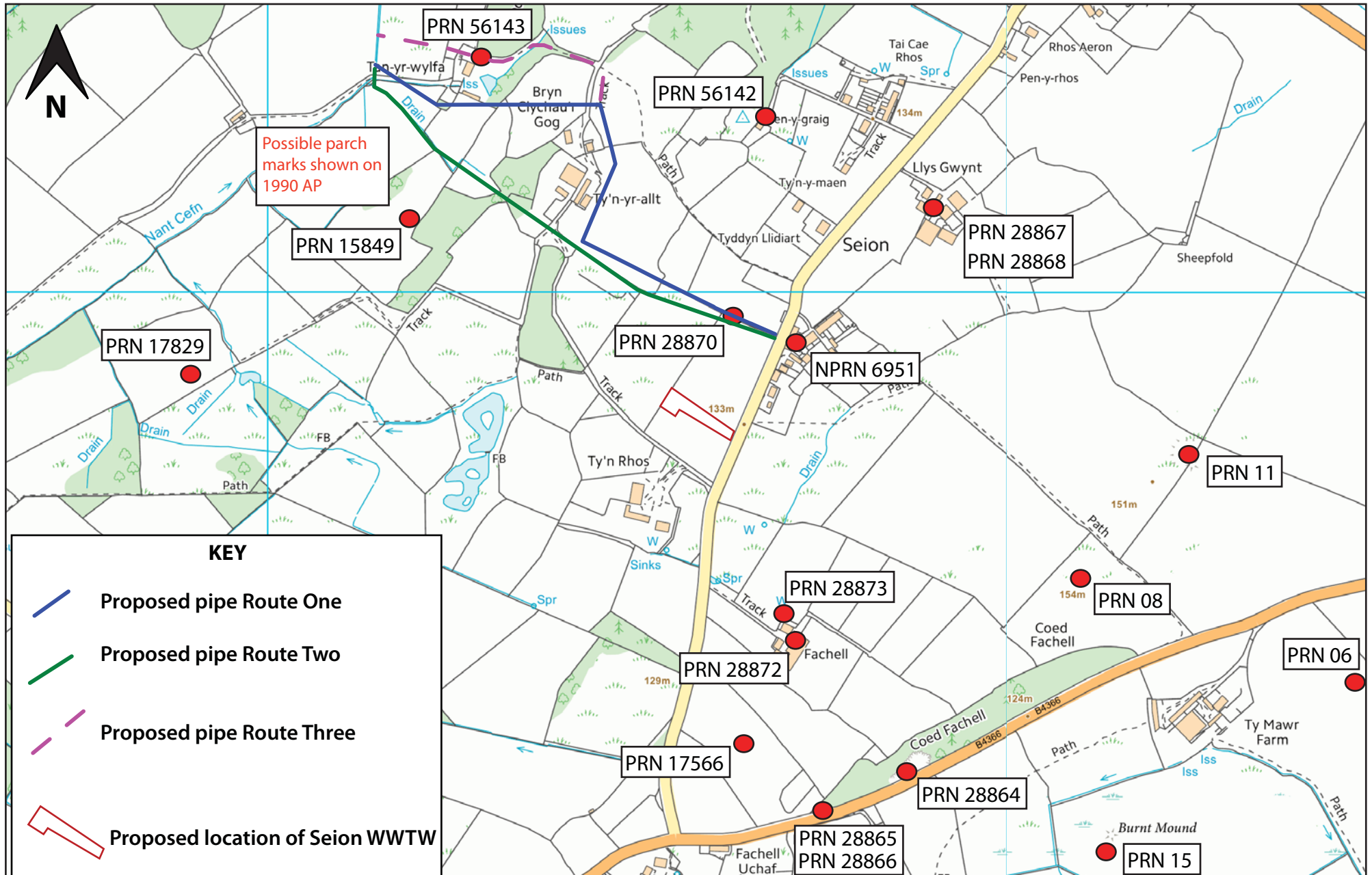
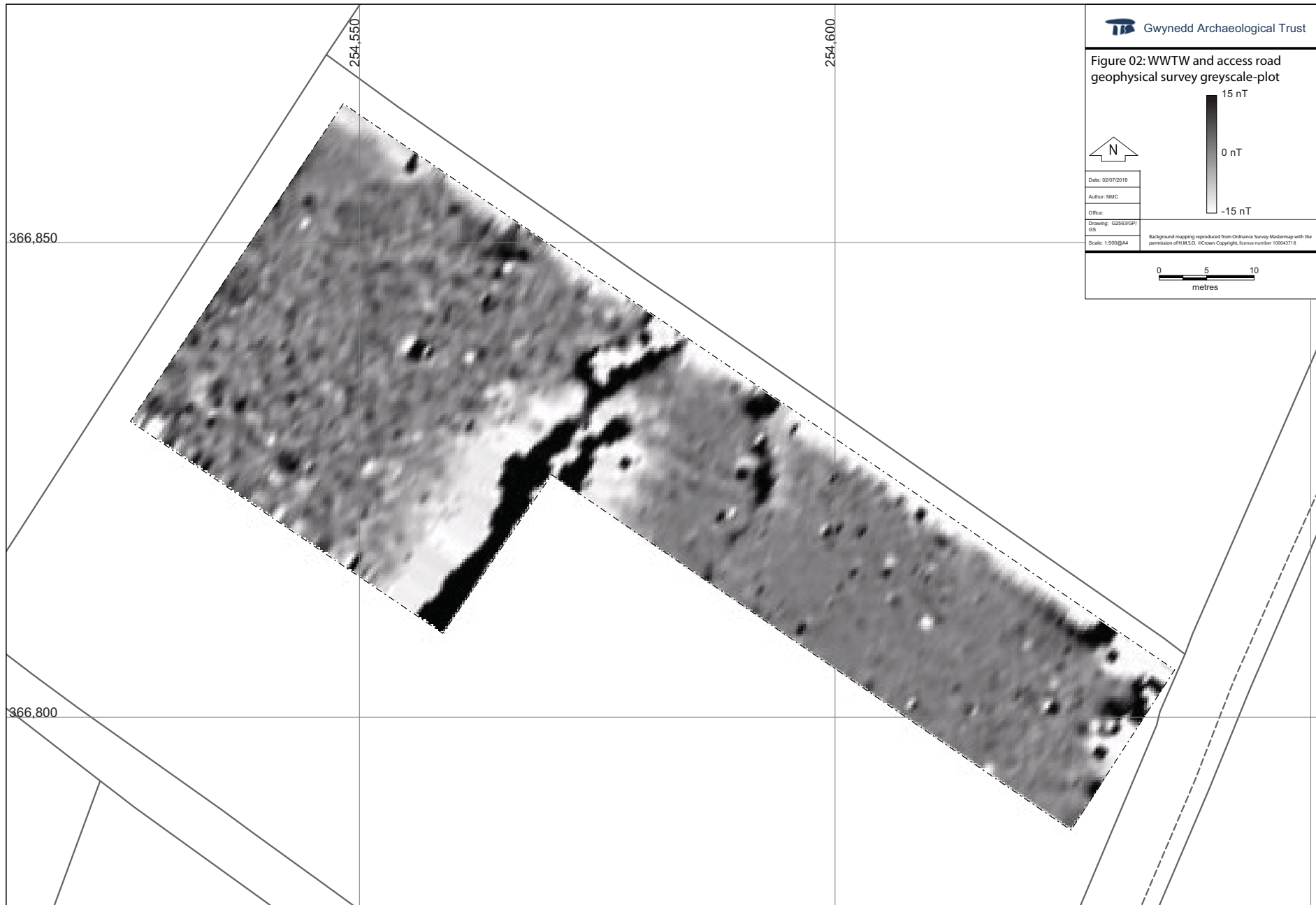




Figure 01: Location of archaeological features (red dots) in relation to development site (red outline). Scale 1:7,000 @ A4.

Base map taken from Ordnance Survey 1: 10,000 Series Sheet SH56 NW and NE. © Crown copyright. All rights reserved. License number AL100020895



 Gwynedd Archaeological Trust

**Figure 02: WWTW and access road geophysical survey greyscale-plot**

 N

Date: 02/07/2018  
 Author: NMC  
 Office:  
 Drawing: 02593/GP1/GS  
 Scale: 1:500@A4

15 nT  
 0 nT  
 -15 nT

Background mapping reproduced from Ordnance Survey Mastermap with the permission of HM Land Registry. © Crown Copyright, license number 10004718

0 5 10  
 metres





Figure 03: Tithe Map and Apportionment of the Parish of Llanddeiniolen 1838, with the WWTW and Pipeline Routes overlain (National Archives).  
Scale 1:6000 @A4

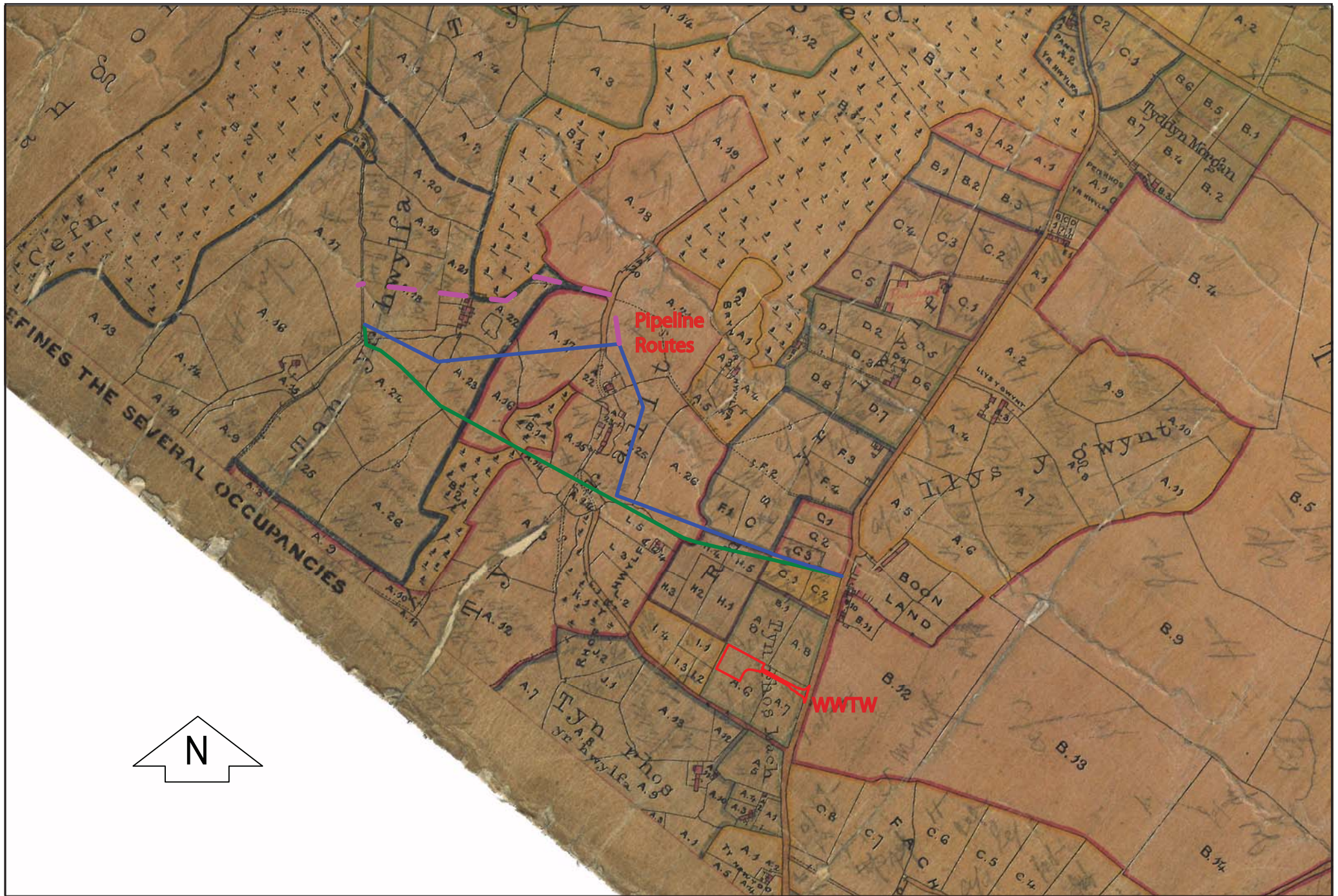


Figure 04: Plan of Farms in the north of the Parish of Llanddeiniolen, part of the "Surveys of the Vaynol Estate made for the purposes of Valuation", begun by the late Robert Lloyd Ellis and completed by Frederick Jackson (1867), with the WWTW and Pipeline Routes overlain (Gwynedd Archives, X/Vaynol/4138-9). Scale 1:6000 @A4

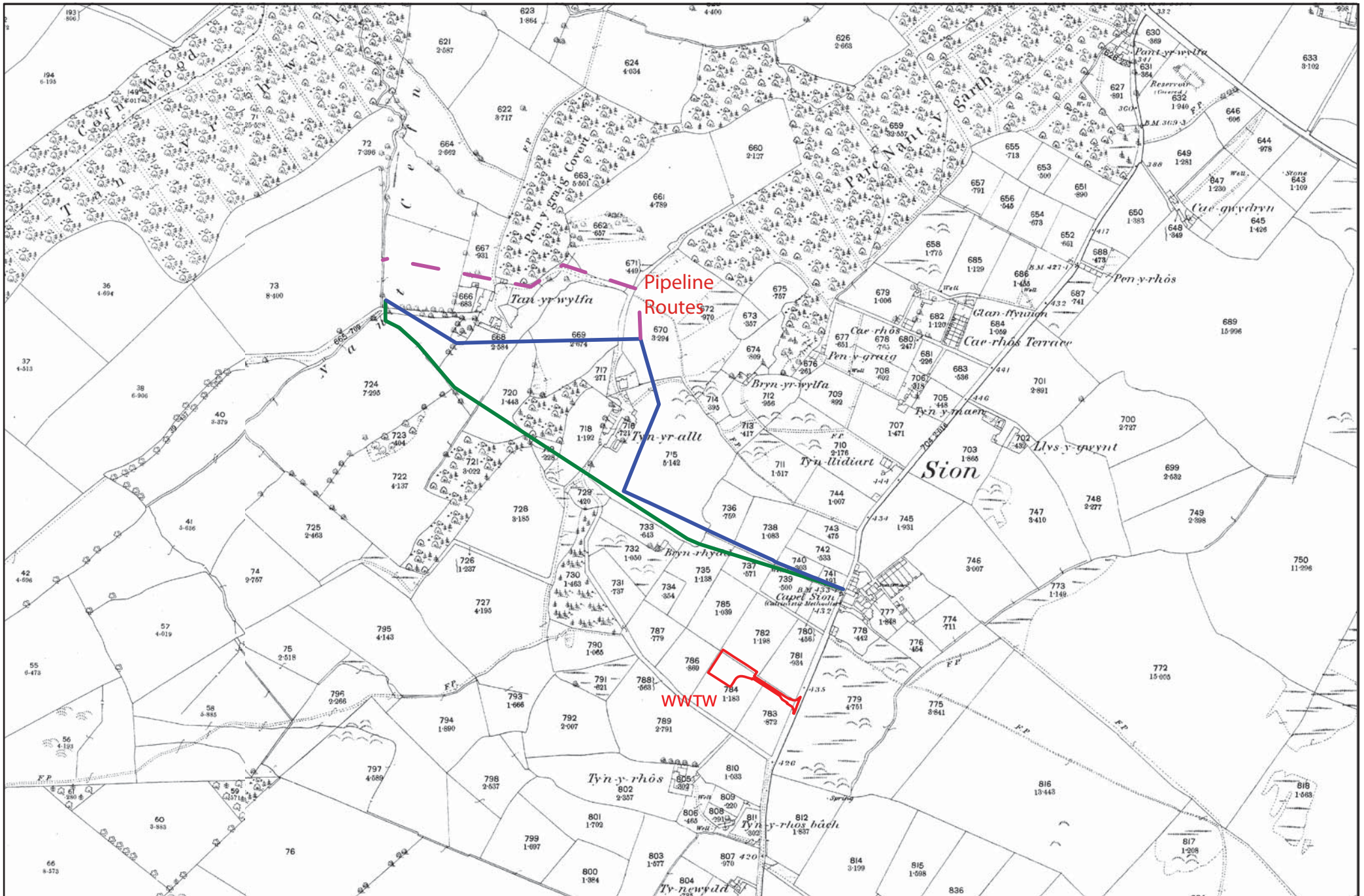


Figure 05: Ordnance Survey Caernarfonshire County Series 1st edition 25 inch map of 1889, sheet XI.7, with the WWTW and Pipeline Routes overlain. Scale 1:6000 @A4

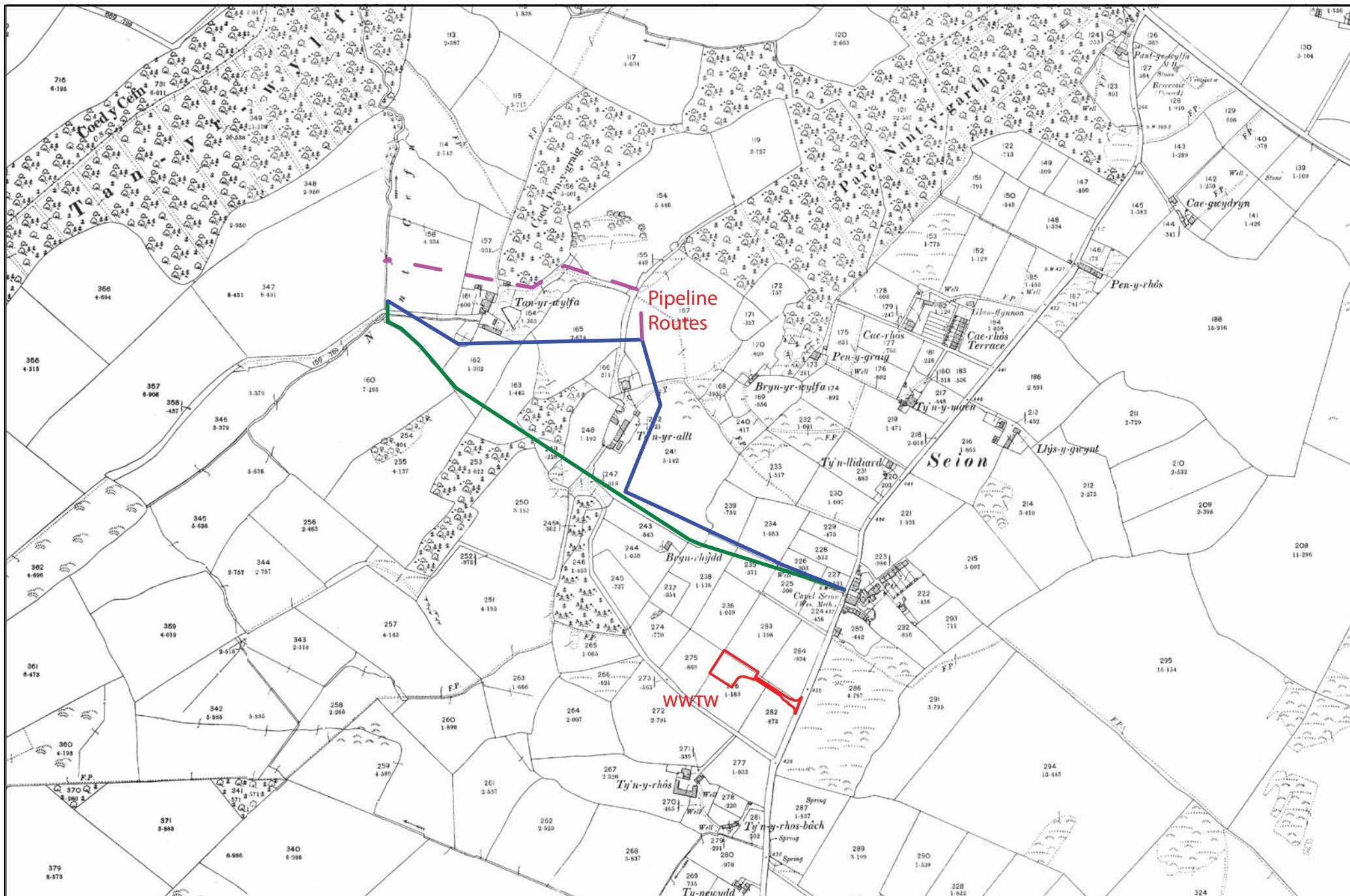


Figure 06: Ordnance Survey Caernarfonshire County Series 2nd edition 25 inch map of 1900, sheet XI.7, with the WWTW and Pipeline Routes overlain. Scale 1:6000 @A4

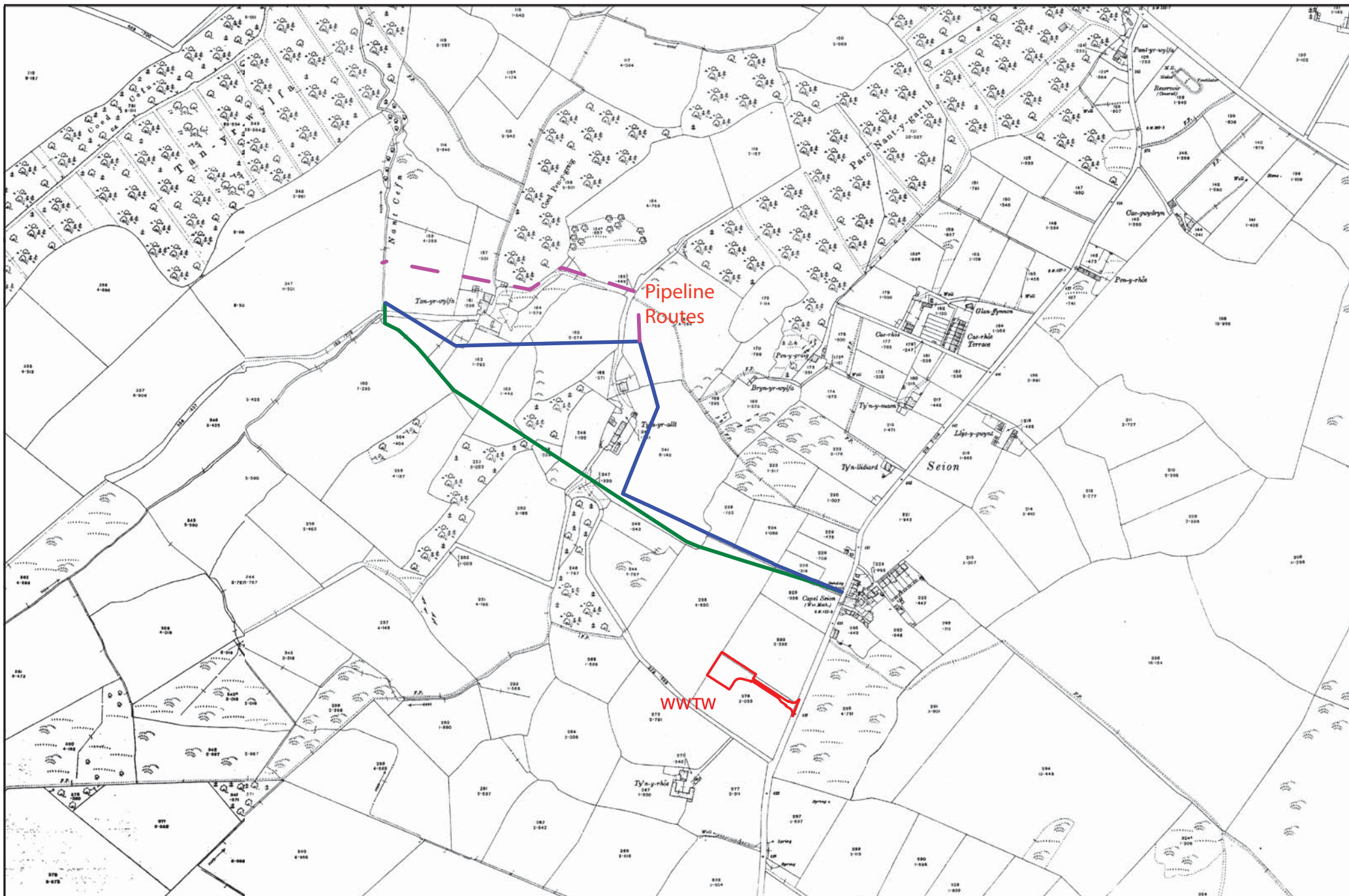


Figure 07: Ordnance Survey Caernarfonshire County Series 3rd edition 25 inch map of 1914, sheet XI.7, with the WWTW and Pipeline Routes overlain.  
 Scale 1:6000 @A4

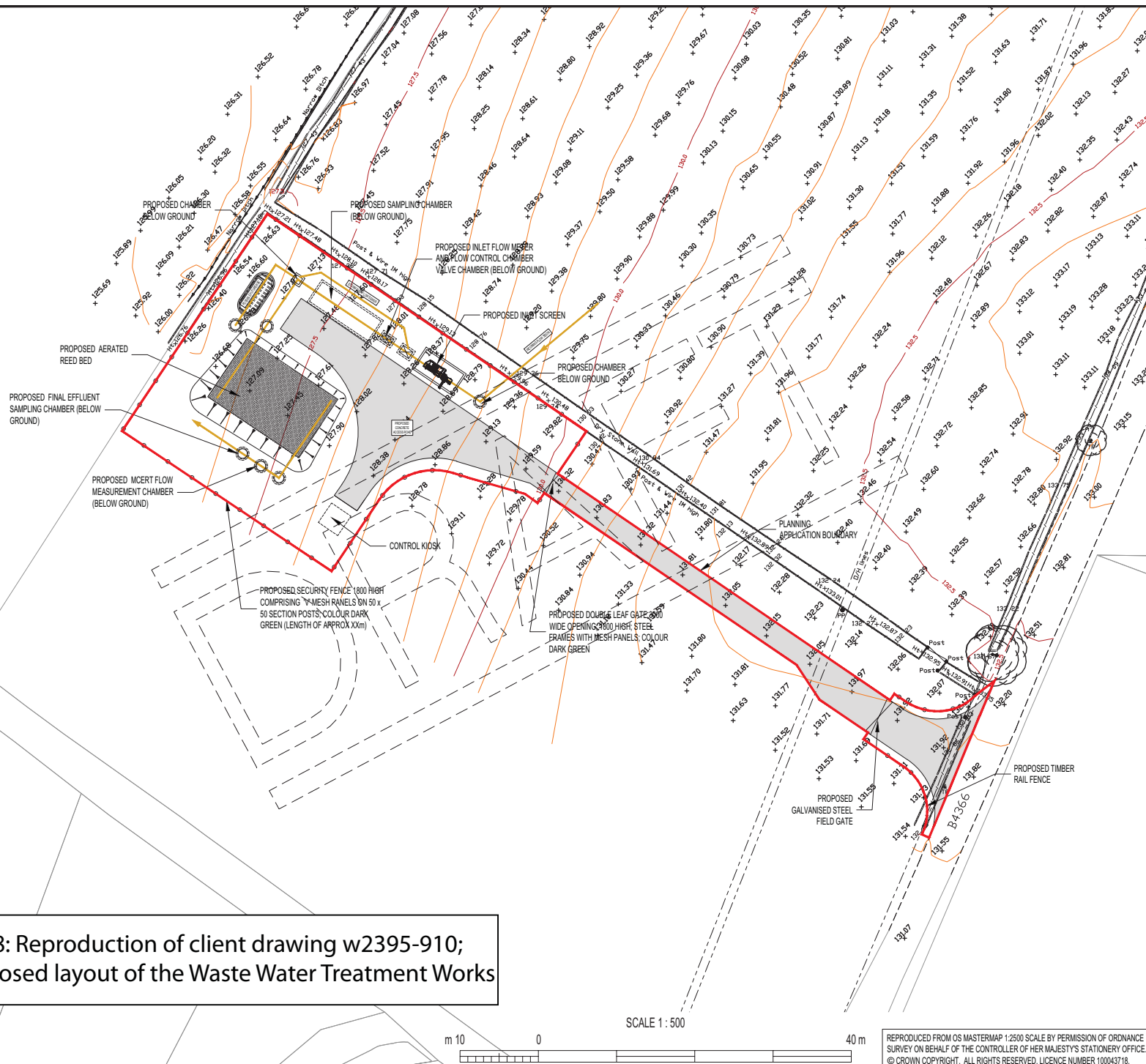


Figure 08: Reproduction of client drawing w2395-910; the proposed layout of the Waste Water Treatment Works

**NOTES**

- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS SHOWN OTHERWISE.

**KEY**

- FOUL SEWER ROUTE
- PLANNING APPLICATION BOUNDARY

SITE LOCATION  
GRID REFERENCE: 254701, 366863

**CAUTION: THE MANAGEMENT AND DESIGN OF ANY AND ALL TEMPORARY WORKS REQUIRED TO EXECUTE THIS DESIGN ARE THE RESPONSIBILITY OF THE CONTRACTOR.**

REV.	DATE	DESCRIPTION	DSGND	CHKD	APPD
A00	31-01-18	FIRST ISSUE	DGJ	KJP	TM

CLIENT

PRINCIPAL DESIGNER  
DŴR CYMRU WELSH WATER

Waterco Ltd., Eden Court, tel (+44) 1824 702220  
Lon Parcwr Business Park, Ruthin LL15 1NJ www.waterco.co.uk

SCHEME  
SEION FOUL SOLUTION

TITLE  
PROPOSED SITE LAYOUT  
GENERAL ARRANGEMENT

STATUS  
PLANNING APPLICATION

DESIGNED	CHECKED	APPROVED	SCALE / SHEET SIZE
MJ	KJP	TM	1 : 500 / A3
DRAWING NO. w2395-9101			REV A00

REPRODUCED FROM OS MASTERMAP 1:2500 SCALE BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NUMBER 100043718.

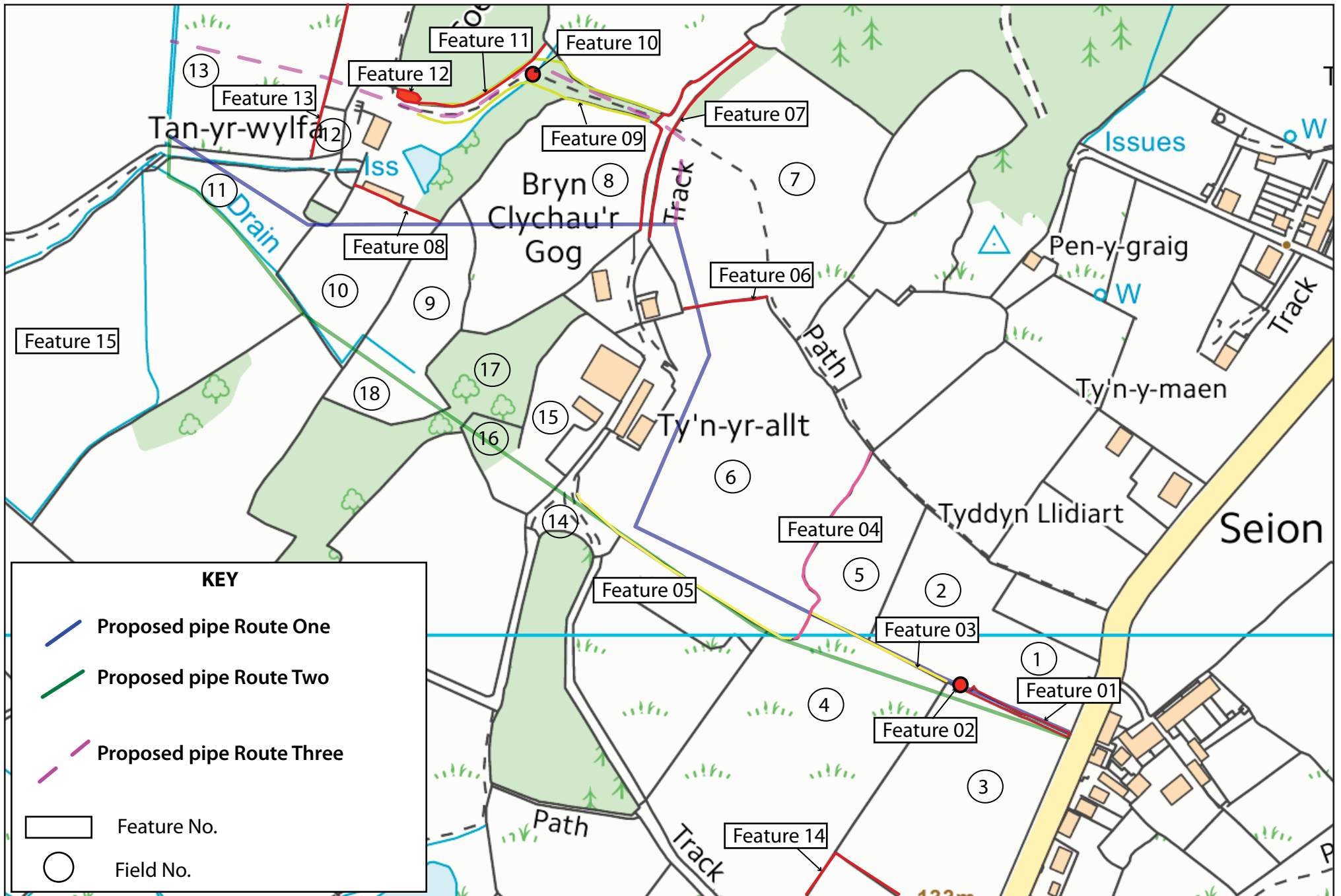
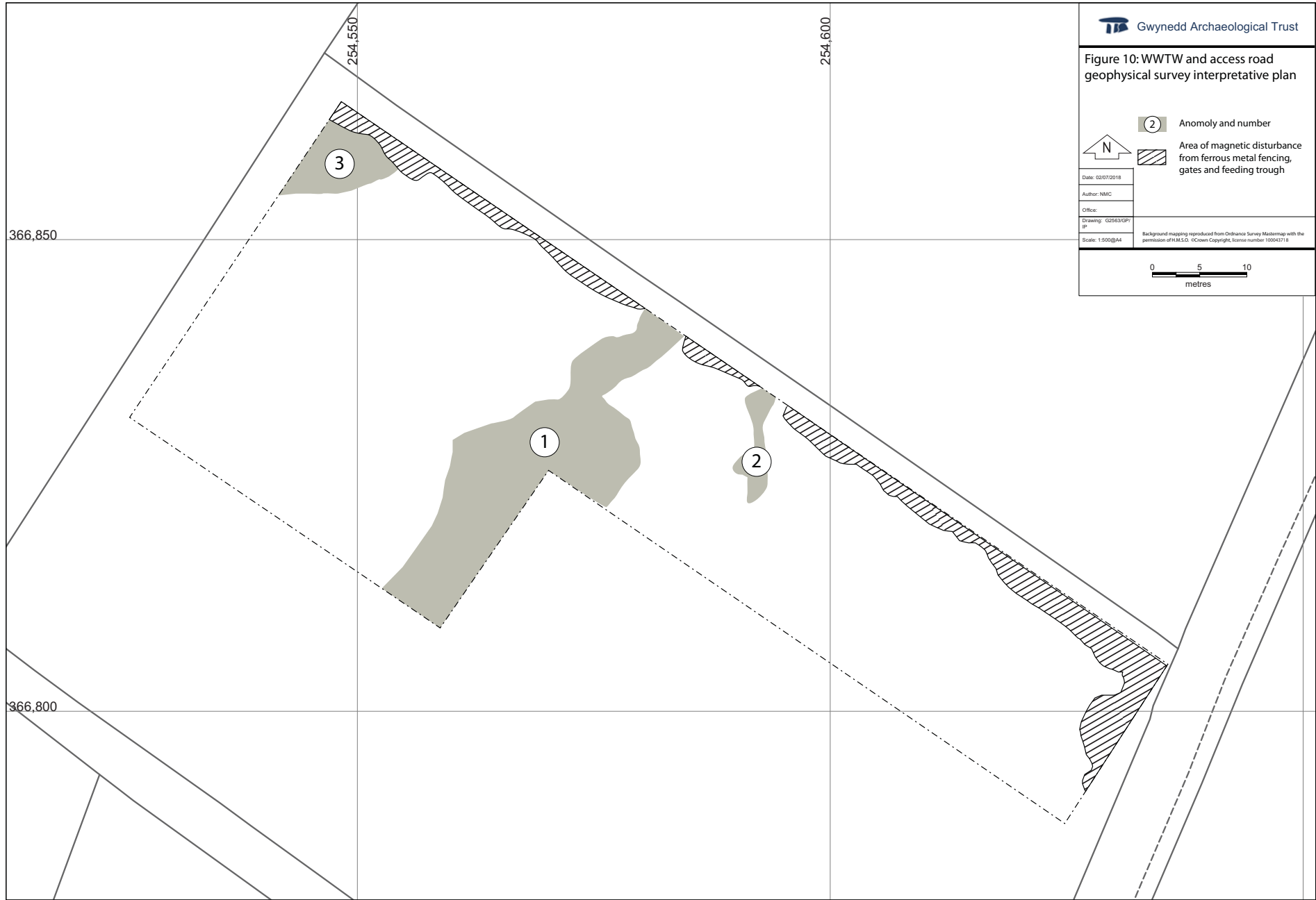


Figure 09: Location of Proposed Pipeline Routes, Archaeological Features and Fields of the Desk-based Assessment and Walkover Survey. Scale 1:3,000 @A4. Base map taken from Ordnance Survey 1: 10,000 Series Sheet SH56 NW and NE. © Crown copyright. All rights reserved. License number AL100020895



Gwynedd Archaeological Trust

**Figure 10: WWTW and access road geophysical survey interpretative plan**

Anomaly and number

Area of magnetic disturbance from ferrous metal fencing, gates and feeding trough

N

Date:	02/07/2018
Author:	NMC
Office:	
Drawing:	G2563/GP1
IP:	
Scale:	1:500@A4

Background mapping reproduced from Ordnance Survey Mastermap with the permission of HM Land Registry. © Crown Copyright. Licence number: 10004718

0 5 10 metres





Plate 1 - View of field entrance and gateway to adjoining field to the north (archive reference: G2563\_010).



Plate 2 - Proposed WWTW location in northern corner of field (archive reference: G2563\_011).



**Plate 3 - View along northern field boundary towards entrance along proposed access road route (archive reference: G2563\_005).**



**Plate 4 - View along northern field boundary from entrance along route of proposed access road towards treatment plant location (archive reference: G2563\_001).**



**Plate 5 - View along southern field boundary towards lower western corner of field (archive reference: G2563\_012).**



**Plate 6 - Close up view of field entrance and clawdd wall field boundary on eastern side of field (archive reference: G2563\_014).**



Plate 7 - Wetter ground in northern corner of field (archive reference: G2563\_009).



Plate 8 - General shot of Fields 1, 2 and 3 (taken from Field 2); proposed pipe route 1 (archive reference: G2563\_031).



Plate 9 - View of Field 3, proposed pipe route 2 (archive reference: G2563\_024).



Plate 10 - Manhole cover adjacent to Feature 4, Field 5; scale: 1x1m (archive reference: G2563\_035).



Plate 11 - South field boundary of Field 1, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_020).



Plate 12 - Primary Reference Number: 71209. Field 3 remnants of slate and wire fencing, proposed pipe routes 1 & 2; scale: 1x1m (archive reference: G2563\_022).



Plate 13 - Primary Reference Number: 28870. Well - Feature 2, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_027).



Plate 14 - Primary Reference Number: 28870. Interior of well - Feature 2, Field 2, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_028).



Plate 15 - Primary Reference Number: 71210. Feature 3 - clawdd - Field 2, proposed pipe route 1; scale: 1x1m (archive reference: G2563\_029).



Plate 16 - Primary Reference Number: 71211. Close-up of north face of Feature 4, Field 5; scale: 1x1m (archive reference: G2563\_037).





Plate 17 - Primary Reference Number: 71212. Feature 5, southern field boundary of Field 6; scale: 1x1m (archive reference: G2563\_044).



Plate 18 - Proposed pipe route 2 through Field 6; scale: 1x1m (archive reference: G2563\_048).



Plate 19 - Primary Reference Number: 71213. Exit point for proposed pipe route 1 through Feature 6; scale: 1x1m (archive reference: G2563\_054).



Plate 20 - Primary Reference Number: 71214. Feature 7 (lane); scale: 1x1m (archive reference: G2563\_059).



Plate 21 - Primary Reference Number: 71214. Feature 7, eastern clawdd; scale: 1x1m (archive reference: G2563\_060).



Plate 22 - Primary Reference Number: 71215. Proposed pipe route 1 through Field 10; scale: 1x1m (archive reference: G2563\_066).



Plate 23 - Primary Reference Number: 71216. Proposed pipe route 3 access to Feature 9; scale: 1x1m (archive reference: G2563\_068).



Plate 24 - Primary Reference Number: 71216. Proposed pipe route 3 through Feature 9; scale: 1x1m (archive reference: G2563\_069).



**Plate 25 - Primary Reference Number: 71216. Proposed pipe route 3 through Feature 9; scale: 1x1m (archive reference: G2563\_072).**



**Plate 26 - Primary Reference Number: 71217. Location of Feature 10, set within Feature 9, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_071).**



Plate 27 - Primary Reference Number: 71217. Close-up of Feature 10, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_070).



Plate 28 - Primary Reference Number: 71218. Southwest face of Feature 11, proposed pipe route 3; scale: 1x1m (archive reference: G2563\_073).



Plate 29 - Primary Reference Number: 56143. Features 11 & 12 off proposed pipe route 3; scale: 1x1m (archive reference: G2563\_074).



Plate 30 - Primary Reference Number: 56143. Entrance to lean to structure of Feature 12; scale: 1x1m (archive reference: G2563\_077).



Plate 31 - Primary Reference Number: 56143. West face of Feature 12; scale: 1x1m (archive reference: G2563\_078).



Plate 32 - Primary Reference Number: 71219. Exit point from Field 12 (Feature 13), proposed pipe route 3; scale: 1x1m (archive reference: G2563\_084).





Plate 33 - Primary Reference Number: 71219. Feature 13 in Field 12; scale: 1x1m  
(archive reference: G2563\_085).

SEION WASTE WATER TREATMENT WORKS,  
SEION GWYNEDD  
(G2563)

Historic Environment Record Event Primary Reference  
Number: 45274

PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION

*Prepared for*

*DWR CYMRU*

*June 2018*

Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

<b>Approvals Table</b>				
	<b>Role</b>	<b>Printed Name</b>	<b>Signature</b>	<b>Date</b>
Originated by	Document Author			
Reviewed by	Document Reviewer			
Approved by	Principal Archaeologist			

<b>Revision History</b>			
<b>Rev No.</b>	<b>Summary of Changes</b>	<b>Ref Section</b>	<b>Purpose of Issue</b>
01	Edited aims and objectives to reflect evaluation and future work	1.1	
	Edits to Introduction to include walkover survey of all 3 pipe routes	1.0	
	Inclusion of moated site	2.0	
	Inclusion of geology	2.1	

All GAT staff should sign their copy to confirm the project specification is read and understood and retain a copy of the specification for the duration of their involvement with the project. On completion, the specification should be retained with the project archive:

Name

Signature

Date

**SEION WASTE WATER TREATMENT WORKS, SEION GWYNEDD (G2563)**

**PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION**

Prepared for *Dwr Cymru*, June 2018

Historic Environment Record Primary Reference Number: 45274

**CONTENTS**

- 1 INTRODUCTION .....5
  - 1.1 Evaluation Aims and Objectives.....6
- 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND.....8
  - 2.1 Geology.....9
- 3 METHODOLOGY .....10
  - 3.1 Assessment (Desktop Study).....10
  - 3.2 Walkover Survey .....11
  - 3.3 Gazetteer .....11
  - 3.4 Geophysical Survey .....12
    - 3.4.1 Summary .....12
    - 3.4.2 Instrumentation.....12
    - 3.4.3 Data Collection .....13
    - 3.4.4 Data Processing .....13
    - 3.4.5 Aims.....14
  - 3.5 Data processing and report compilation.....15
- 4 DISSEMINATION AND ARCHIVING .....17
- 5 PERSONNEL.....18
- 6 HEALTH AND SAFETY .....19
- 7 INSURANCE.....20
  - 7.1 Public Liability .....20
  - 7.2 Employers Liability .....20
  - 7.3 Professional Indemnity .....20
- 8 SOURCES CONSULTED .....21
- Figure 01 .....22
  - Location of archaeological features (red dots) in relation to development site (red outline).  
Scale 1:7,000 @ A4.....22
- Figure 02 .....23

Reproduction of client drawing w2395-910; the proposed layout of the Waste Water Treatment Works.....	23
Figure 03 .....	24
Reproduction of Client Drawing No w2395-0001 and location of possible pipe routes.....	24
Figure 04 .....	25
Caernarvonshire County Series 25 inch map Sheet XI.1 First (1891) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.....	25
Figure 05 .....	26
Caernarvonshire County Series 25 inch map Sheet XI.1 Second (1901) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.....	26
Figure 06 .....	27
Caernarvonshire County Series 25 inch map Sheet XI.1 Third (1920) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.....	27
Appendix I .....	28
Gwynedd Archaeological Trust photographic metadata pro-forma .....	28
Appendix II .....	29
Gwynedd Archaeological Trust watching brief pro-forma .....	29

# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been commissioned by *Dwr Cymru* to prepare a written scheme of investigation (WSI) for an archaeological evaluation of a proposed waste water treatment works at Seion, Gwynedd (NGR SH54556684; Figure 01). The location for the sewage works is currently a field of pasture located to the south of the village of Seion and to the immediate north of the Ty'n Ross Hotel. The proposed development will replace an existing septic tank with a waste water treatment works that will consist of an inlet channel with storm overflow, storm screen and a fully integral rotating biological contactor (RBC) along with access from the main road (Figure 02). The final effluent outfall from the works will discharge to the Nant y Garth via a newly installed final effluent outfall pipework.

The archaeological evaluation will be conducted in June 2018 and consist of the following:

- A desk-based assessment (DBA) that will incorporate the area of the proposed waste water treatment works and the potential gravity outfall pipe routes to the Nant y Garth (Figure 03);
- A site walkover that will encompass the location of the proposed waste water treatment works and the three proposed routes of the outfall pipe to supplement the DBA;
- A geophysical survey will be conducted of the location of the proposed waste water treatment works.

Once the route of the outfall pipe has been confirmed, this will require a separate WSI along with a geophysical survey. Dependant on the results of the geophysical surveys of the waste water treatment works and route of the outfall pipe, recommendations may be made for the excavation of trial trenches.

This WSI will focus solely on the DBA for the entirety of the project, an accompanying walkover survey of all of the elements of the project and the geophysical survey of the proposed location of the waste water treatment works.

The project will be monitored by the Gwynedd Archaeological Planning Service (GAPS). *The content of this WSI and all subsequent reporting by GAT must be approved by GAPS prior to final issue.*

The archaeological evaluation will be completed in accordance with the following guidance:

- *Standard and Guidance for Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for Archaeological Field Evaluation* (Chartered Institute for Archaeologists, 2014);
- *Standard and Guidance for Geophysical Survey* (Chartered Institute for Archaeologists, 2014);
- *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (Chartered Institute for Archaeologists, 2014);
- *Management of Archaeological Projects* (English Heritage, 1991);
- *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England, 2015);
- *Historic Environment Record (HER) Guidelines for Archaeological Contractors* (Version 1.3; draft) (Gwynedd Archaeological Trust, 2014); and
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

## **1.1 Evaluation Aims and Objectives**

The key aims and objectives are to:

- establish the extent to which archaeological remains survive at the location of the proposed waste water treatment works and within the immediate vicinity;
- establish the date and nature of archaeological remains at the site and assess their implications for understanding the historical development of the area;



- if previously unknown archaeological features are identified through the DBA and the accompanying walkover survey then they will need to be mitigated for, through altering the route of the pipeline or amending the layout of the treatment works, for example; and
- if previously unknown archaeological features are identified through the geophysical survey then they will need to be evaluated with trial trenches to confirm the results. If the trenches confirm the presence of archaeology this may require preservation by record, i.e. further investigation, or preservation in-situ that may require altering the route of the pipeline or amending the layout of the treatment works.

## 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

There are no known archaeological features recorded by the Historic Environment Record (HER) within the proposed location of the waste water treatment works but there are known features within close proximity of the proposed outfall pipeline routes (Figure 01):

- Archaeological features identified in close proximity to proposed outfall pipeline routes include a well (PRN 28870) that is positioned adjacent to a field boundary that demarcates the start of *Route One*; and
- a building to the north west of the farm Tan-yr-wylfa (PRN 56143) which is in close proximity to the terminal of *Route Three*.

It also worth noting that the pipe routes extend through the Arfon plateau (PRN 15849) an area made up of improved pasture, most of which was formerly Vaynol land.

There is also significant archaeological activity within the wider area, indicative of prehistoric and later activity (Figure 01), including the following:

- A burnt mound to the south of Ty Mawr (PRN 15) and adjacent to a small stream. The mound is approximately 1.0m in height with a diameter of approximately 18.0m but the southern half has been destroyed by a modern ditch;
- There are two settlement enclosures approximately 500m to the east of the site, the settlement enclosure of Ty Mawr (PRN 11) and the nearby Ty Mawr enclosure (PRN 8). The former is an oval enclosure, that measures c.50.0m northwest - southeast by 37.0m northeast – southwest, defined by a degraded stone filled bank. Within this enclosure there are two hut circles set against the south circuit of the bank. The latter is a sub - circular enclosure, approximately 26.0m in diameter and is also defined by a stone filled bank, with a possible hut circle at the centre. These settlements are most likely Iron Age (700 BC to 74 AD) or Romano-British (74 to 410 AD) in date;
- Located between these settlements and the site, to the southeast of Seion, are parch marks that may represent remnants of Fachell Roman road (PRN 17566) part of the route from Caerhun to Caernarfon. In addition, there is another possible Roman road that extends north east between the farms Ty'n-yr-allt and Tan-yr-wylfa that formed part of the route between Segontium and Bangor (PRN 17829);

- To the south east of Ty Mawr farm there is a medieval moated site PRN 6, a scheduled monument that consists of a rectangular earthwork set in a marshy valley bottom. It is comprised of two shallow ditches with a low central bank and there are possible traces of a rectangular building within the interior which measures 42m by 34m. There is an apparent entrance on the north west side, with a 4.5m wide stone causeway cutting through the two ditches;
- There are several post-medieval structures and outbuildings indicative of the rural setting of Seion, that are located within approximately 500m of the proposed site (PRN 28866 – 28868 and 56142) which also include Seion Methodist Chapel (NPRN 6951) which was built in 1818 and repeatedly modified throughout the 19<sup>th</sup> century. The chapel is built in the Classical style with a gable entry plan; and
- There are two quarries (PRN 28864 & 28865) along with a small rectangular structure (PRN 28866) c.500m to the southeast of the site, along the B4366.

An examination of the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet of the area (Sheet XI.1, 1891, 1901 and 1920 respectively) shows the proposed area of development as two separate fields on the First and Second Editions (Figures 04 & 05). By the time of the publication of the Third Edition the division has been removed to form the field that is present today (Figure 06). The Ordnance Survey maps also show the gradual change from relatively small parcels of land to the creation of larger fields in the early 20<sup>th</sup> century.

## **2.1 Geology**

The underlying bedrock geology in the vicinity of the location of the waste water treatment works primarily consists of Padarn Tuff Formation - Tuff, Felsic. This is Igneous Bedrock formed approximately 541 to 635 million years ago in the Ediacaran Period. In addition, there are veins of an Unnamed Igneous Intrusion, Ordovician – Microgabbro within the Padarn Tuff Formation. This Igneous Bedrock formed approximately 444 to 485 million years ago in the Ordovician Period.

## 3 METHODOLOGY

### 3.1 Assessment (Desktop Study)

A desk-based assessment is defined as “a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate” (ClfA 2014, 4).

The desk-based assessment will involve a study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area, defined as the power station and the extent of works on *First Hydro Company Drawing No. SK01252* (Figure 01), along with a 50m assessment buffer. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the HER. All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of sites should be defined;
2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features;
4. On-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU);
5. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Gwasanaeth Archifau Gwynedd,

Cyngor Gwynedd, Caernarfon LL55 1SH and Meirionnydd Record Office, Bala Rd, Dolgellau LL40 2YF);

6. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at <http://lle.gov.wales/home> for information on potential surface features using digital terrain modelling and digital surface modelling.

### **3.2 Walkover Survey**

A walkover survey will be conducted of the proposed location of the waste water treatment works and the three proposed routes of the outfall pipe to supplement the DBA. The walkover survey will identify any new archaeological features on the ground and accurately map and describe them on GAT pro-formas. The sites will then be added to the overall gazetteer and their relative importance defined. The potential for sub-surface archaeology will be estimated and defined.

A photographic record will be maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3000; resolution: 3,872 × 2,592 [10.2 effective megapixels]) and photographic metadata table will be completed and included in the report. Photographic images will be archived in TIFF format; the archive numbering system will start from **G2563\_001**. A handheld GPS unit will also be used during the walkover survey.

### **3.3 Gazetteer**

A gazetteer will be compiled for any identified sites within and within proximity to the specified route based on information sourced from the regional HER; the gazetteer will include:

1. Feature Number
2. Site name
3. PRN number
4. Grid reference
5. Period
6. Site type
7. Assessment category
8. Description
9. Impact
10. Recommendation for further assessment/evaluation
11. Recommendation for mitigatory measures

## **3.4 Geophysical Survey**

### *3.4.1 Summary*

The geophysical survey will include the field encompassing the proposed location of the waste water treatment works Figure 01 and will be carried out in a series of 20m grids, which will be tied into the Ordnance Survey grid using a Trimble high precision GPS system. The survey will be conducted using a Bartington Grad 601-2 dual fluxgate gradiometer with a 1.0m traverse interval and a 0.25m sample interval.

### *3.4.2 Instrumentation*

The Bartington Grad 601-2 dual fluxgate gradiometer uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies. The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil, therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns as fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites. Not all surveys can produce good results as results can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features. The Bartington Grad 601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 500mm apart. Their cores are driven in and out of magnetic saturation by a 1,000Hz alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output. The gradiometer can detect anomalies down

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

### *3.4.3 Data Collection*

The gradiometer includes an on-board data-logger. Readings are taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval is 1.0m and readings are logged at intervals of 0.25m along each traverse. Marked guide ropes are used to ensure high positional accuracy during the high resolution survey. The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor2 software. The data is presented as a grey scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by an interpretation diagram showing the main feature of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most susceptible to misinterpretation due to the propensity of the human brain to define shapes and patterns in random background "noise". An assessment of the confidence of the interpretation is given in the text.

### *3.4.4 Data Processing*

The data is presented with a minimum of processing although corrections are made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc. are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. The data on some 'noisy' or very complex sites can benefit from 'smoothing'. Grey-scale plots are always somewhat pixellated due to the resolution of the

survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots can therefore be interpolated thus producing more but smaller pixels and a small amount of smoothing based on a low pass filter can be applied. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

#### *3.4.5 Aims*

The report will include a discussion of the grey scale plot and an interpretation of the any anomalies identified; these anomalies will be presented as either positive or negative, suggesting whether they could be cut features (ditches, pits etc.), or built sub-surface features (e.g., banks). Figures will be included for the grey scale plot and for the anomaly interpretation. The results of the geophysical survey will be used to inform the location of the trial trenching.



### 3.5 Data processing and report compilation

Following completion of the stages outlined above, a report will be produced incorporating the following:

1. Front cover;
2. Inner cover;
3. Figures and Plates List
4. Non-technical summary;
5. Introduction;
6. Methodology
  - i. Desk-based assessment
  - ii. Walkover survey
  - iii. Geophysical survey
7. Results
  - a. Desk based assessment
    - i. Location and geological summary
    - ii. Statutory and non-statutory designations
    - iii. Environmental remains and soil morphology
    - iv. Historical and archaeological background
    - v. Cartographic evidence
    - vi. Artefact potential
    - vii. Aerial photographs and LiDAR;
  - b. Gazetteer of features
  - c. Walkover survey
  - d. Geophysical survey
8. Conclusions and recommendations
  - a. Conclusion
  - b. Table of sites and recommendations
9. Acknowledgements
10. Bibliography
  - a. Primary sources
  - b. Secondary sources
11. Figures; inc.:
  - location plan;
  - historic mapping;
  - location plan with identified features
  - grey scale plot
  - anomaly identification and interpretation
12. Appendix I (approved written scheme of investigation)
13. Appendix II (Sites listed on GAT Historic Environment Record)
14. Appendix III (Definition of mitigation terms)
15. Appendix IV Photographic metadata (walkover survey)
16. Back cover

Illustrations will include plans of the location of the study area and archaeological sites. Historical maps, when appropriate and if copyright permissions allow, will be included.

A draft copy of the report will be completed by the end of July 2018 and will be sent to GAPS and *Dwr Cymru*. Once approved, a copy of the report will immediately be submitted to GAPS, *Dwr Cymru* and to the GAT HER. Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata.

## 4 DISSEMINATION AND ARCHIVING

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological evaluation outlined in this WSI will commence in June 2018. A draft report will be submitted within one month of fieldwork completion (end of July 2018); a final report will be submitted to the Historic Environment within six months of submitting the draft report (submission date tbc).

The following dissemination will apply:

- A paper report(s) plus digital report(s) will be provided to the client and GAPS (draft report then final report);
- A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of project completion (final report only);
- If appropriate, digital information such as the project database, GIS table(s) and photographs, will be submitted to the regional Historic Environment Record at Gwynedd Archaeological Trust within six months of project completion. All digital datasets submitted will conform to the required standards set out in Gwynedd Archaeological Trust's *Historic Environment Record (HER) Guidelines for Archaeological Contractors* (Version 1.3; draft);
- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only);
- Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales shall be undertaken in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata;
- Dependent on the results of the evaluation, a summary note or a specific article will be included in the Council for British Archaeology Wales publication *Archaeology in Wales*. This shall be agreed with GAPS, and client in advance of publication along with all publication content. GAPS involvement in the project will be acknowledged therein.

## **5 PERSONNEL**

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The evaluation will be completed by a project officer who will have responsibility for completing the desk based assessment, maintaining the site archive, liaising with GAPS and *Dwr Cymru* and submitting the draft report and final report. Project archaeologists will conduct the walkover survey and geophysical survey and responsibility for maintaining the site archive and contributing to the draft and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

## **6 HEALTH AND SAFETY**

The GAT Project Archaeologist(s) will be CSCS certified. Copies of the site specific risk assessment will be supplied to the client and sub-contractor prior to the start of fieldwork. Any risks and hazards will be indicated prior to the start of work via a submitted risk assessment. All GAT staff will be issued with required personal safety equipment, including high visibility jacket, steel toe-capped boots and hard hat (where applicable). All GAT fieldwork is undertaken in accordance with the Trust's Health and Safety Manual, Policy and Handbook which were prepared by Ellis Whittam.

## **7 INSURANCE**

*The project is due to commence after the current insurance policies expire. The client will be sent the relevant details once these insurances have been renewed.*

### **7.1 Public Liability**

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2018

### **7.2 Employers Liability**

Limit of Indemnity- £10,000,000 any one occurrence.

The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2018

### **7.3 Professional Indemnity**

Limit of Indemnity- £5,000,000 in respect of each and every claim

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

POLICY NUMBER

HU PI 9129989/1208

EXPIRY DATE 23/07/2018

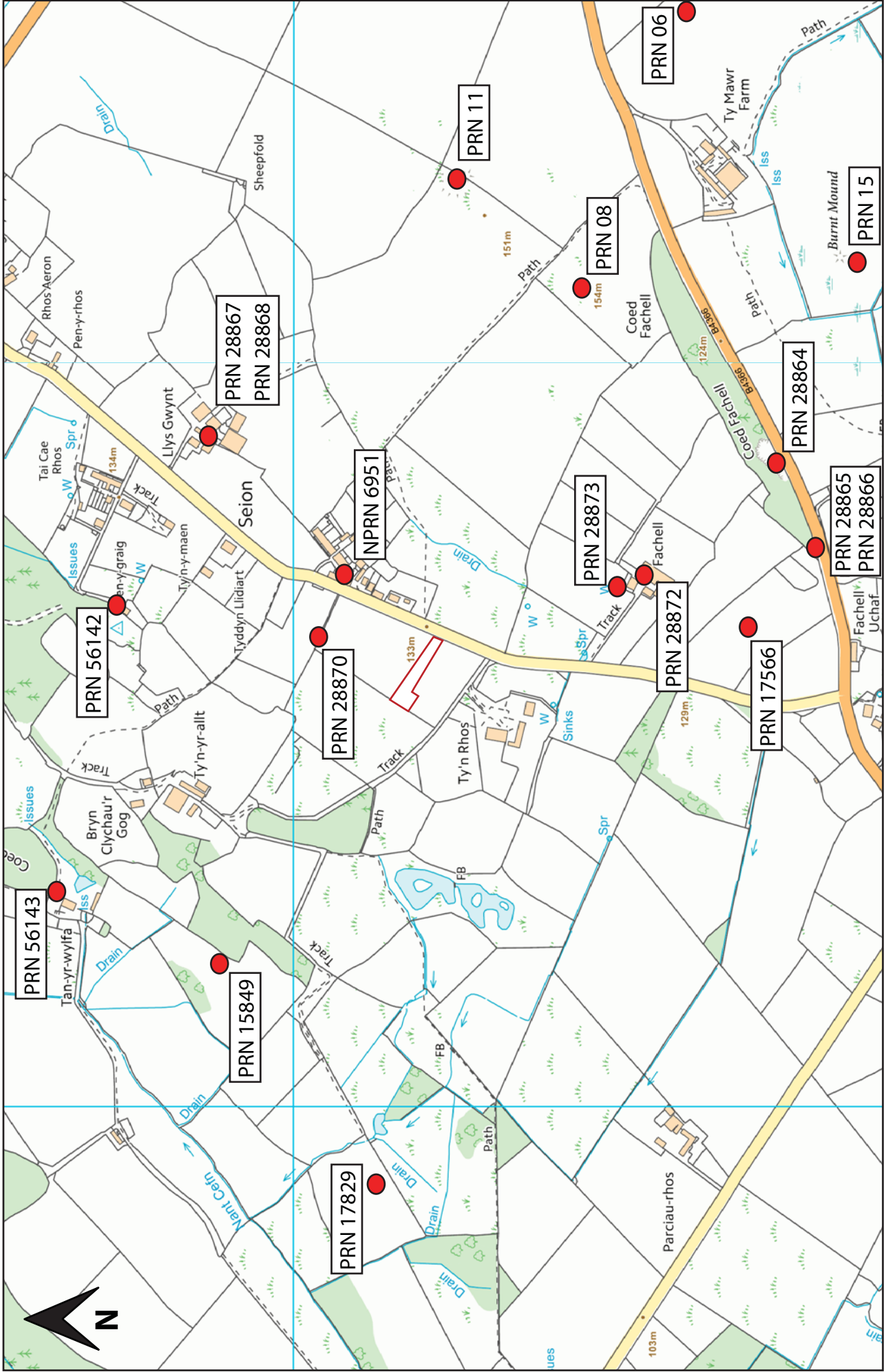
## 8 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Desk-based Assessment*;
2. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Geophysical Survey*;
3. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Archaeological Field Evaluation*;
4. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*;
5. English Heritage, 2011, *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation*;
6. Gwynedd Archaeological Trust, 2014, *Historic Environment Record (HER) Guidelines for Archaeological Contractors (Version 1.3; draft)*;
7. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*;
8. Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheet XI.1, 1891;
9. Ordnance Survey Second Edition 1-inch to 25-mile County Series Map Sheet XI.1, 1901;
10. Ordnance Survey Third Edition 1-inch to 25-mile County Series Map Sheet XI.1, 1920;
11. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*

## **FIGURE 01**

**Location of archaeological features (red dots) in relation to development site (red outline). Scale 1:7,000 @ A4.**

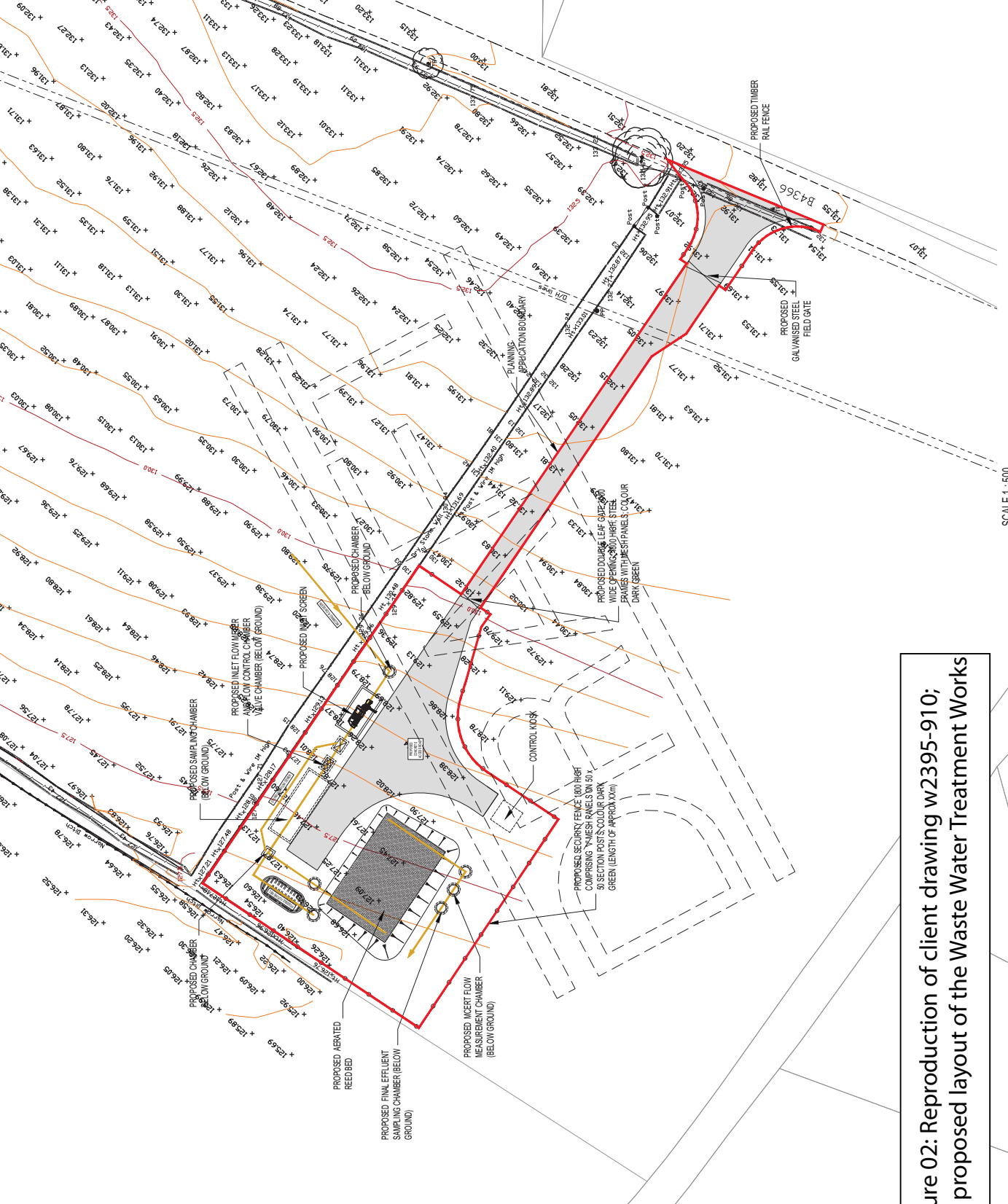




**Figure 01: Location of archaeological features (red dots) in relation to development site (red outline). Scale 1:7,000 @ A4.**  
 © Crown copyright. All rights reserved. License number AL100020895

## **FIGURE 02**

**Reproduction of client drawing w2395-910; the proposed layout of the Waste Water Treatment Works**



**NOTES**

1. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS SHOWN OTHERWISE.

**KEY**

FOUL SEWER ROUTE

PLANNING APPLICATION BOUNDARY

**CAUTION: THE MANAGEMENT AND DESIGN OF ANY AND ALL TEMPORARY WORKS REQUIRED TO EXECUTE THIS DESIGN ARE THE RESPONSIBILITY OF THE CONTRACTOR.**

**NOTE:** THE MANAGEMENT AND DESIGN OF ANY AND ALL TEMPORARY WORKS REQUIRED TO EXECUTE THIS DESIGN ARE THE RESPONSIBILITY OF THE CONTRACTOR.

SITE LOCATION  
GRID REFERENCE: 254701 36983

REV	DATE	DESCRIPTION	ISSUED (CHKD)	APPD
A00	31/01/18	FIRST ISSUE	DCJ, K.P, TM	

**CLIENT**

**DŵR CYMRU WELSH WATER**

**watercoo consultants**

Watercoo Ltd, Eden Court,  
Lion Park Business Park, Ruidhir, LL15 1NU  
Tel: (+44) 1824 702220  
www.watercoo.co.uk

**SCHEME**

SEION FOUL SOLUTION

STATUS	DESIGNED	CHECKED	APPROVED	SCALE / SHEET SIZE
	IMU	KJP	TM	1:500 / A3

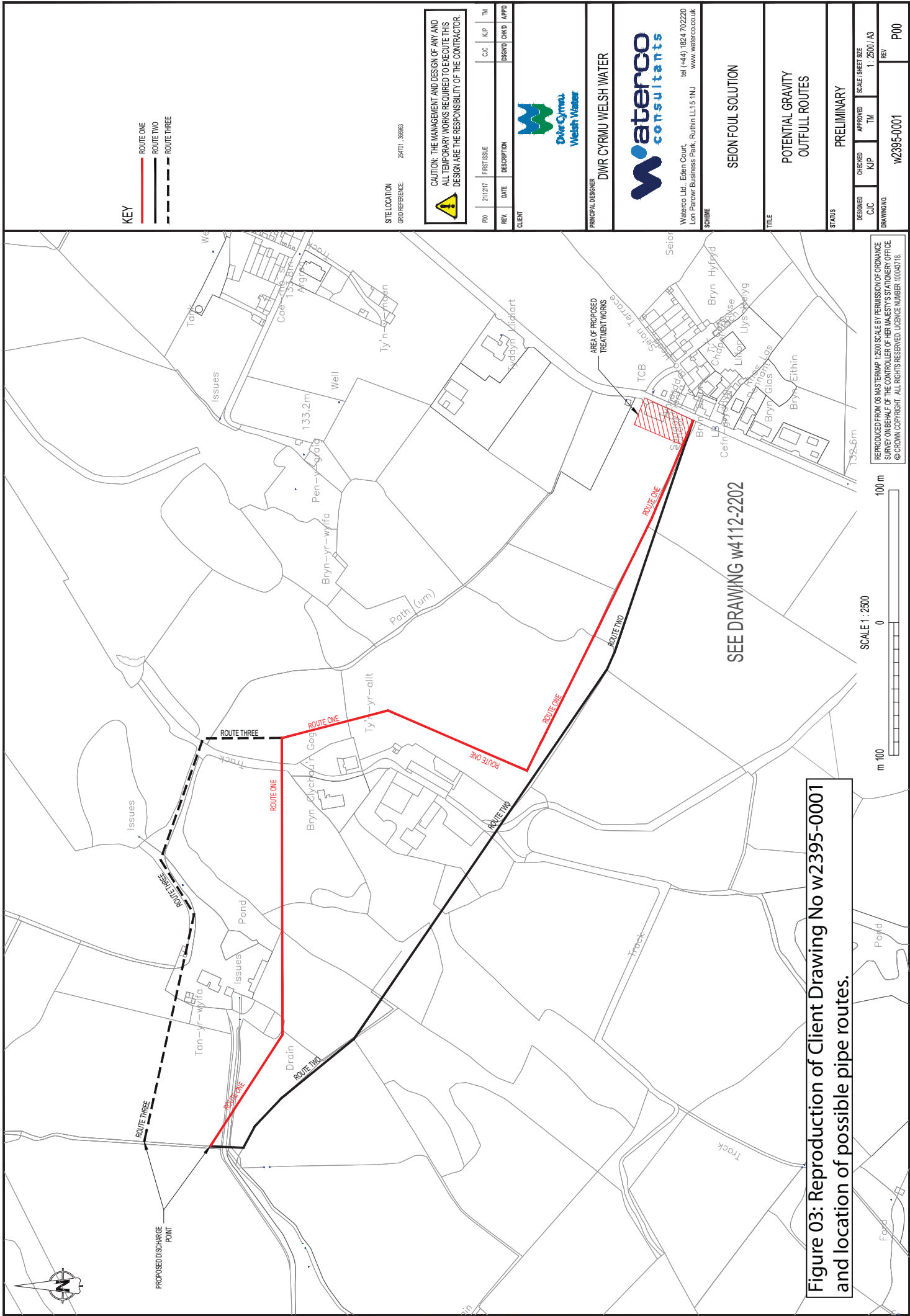
TITLE	DRAWING NO.	REV
PROPOSED SITE LAYOUT GENERAL ARRANGEMENT	W2395-9101	A00

REPRODUCED FROM OS MASTERMAP 1:2500 SCALE BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE  
© CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NUMBER 100043718.

Figure 02: Reproduction of client drawing w2395-910; the proposed layout of the Waste Water Treatment Works

**FIGURE 03**

**REPRODUCTION OF CLIENT DRAWING NO W2395-0001 AND LOCATION OF POSSIBLE PIPE ROUTES.**



**KEY**

- ROUTE ONE (Red solid line)
- ROUTE TWO (Black solid line)
- ROUTE THREE (Black dashed line)

SITE LOCATION  
GRID REFERENCE: 254701, 366983

**CAUTION: THE MANAGEMENT AND DESIGN OF ANY AND ALL TEMPORARY WORKS REQUIRED TO EXECUTE THIS DESIGN ARE THE RESPONSIBILITY OF THE CONTRACTOR.**

REV	DATE	DESCRIPTION	DESIGNED	CHECKED	APPROVED
001	21/12/17	FIRST ISSUE	C/C	K/JP	T/M
002			DS/ND	CH/D	APP/D



PRINCIPAL DESIGNER  
DWR CYMRU WELSH WATER



Watercoo Ltd, Eden Court,  
Lon Parcof Business Park, Rulhih, LL15 1NU  
Tel: (+44) 1824 702220  
www.watercoo.co.uk

SEION FOUL SOLUTION

POTENTIAL GRAVITY  
OUTFALL ROUTES

STATUS  
PRELIMINARY

DESIGNED	CHECKED	APPROVED	SCALE SHEET SIZE
C/C	K/JP	T/M	1:2500 / A3
DRAWING NO.			REV
W2395-0001			P00

REPRODUCED FROM OS MASTERMAP 1:2500 SCALE BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE  
© CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NUMBER: 10004718.



**Figure 03: Reproduction of Client Drawing No w2395-0001 and location of possible pipe routes.**

SEE DRAWING W4112-2202

## **FIGURE 04**

**Caernarvonshire County Series 25 inch map Sheet XI.1 First (1891)  
Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents  
boundary of the proposed Waste Water Treatment Works.**

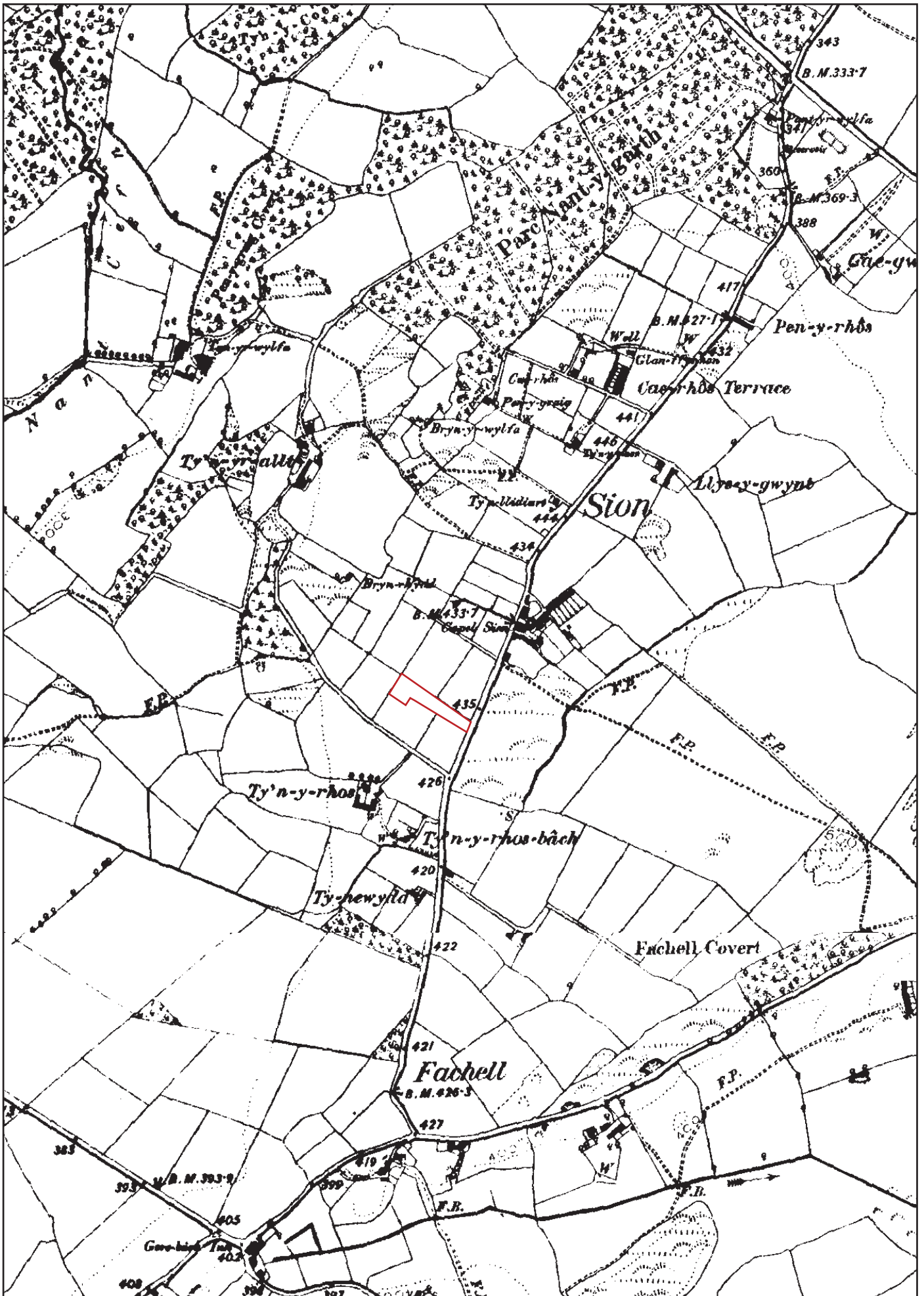


Figure 04: Caernarvonshire County Series 25 inch map Sheet XI.1 First (1891) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.

## **FIGURE 05**

**Caernarvonshire County Series 25 inch map Sheet XI.1 Second (1901)  
Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents  
boundary of the proposed Waste Water Treatment Works.**



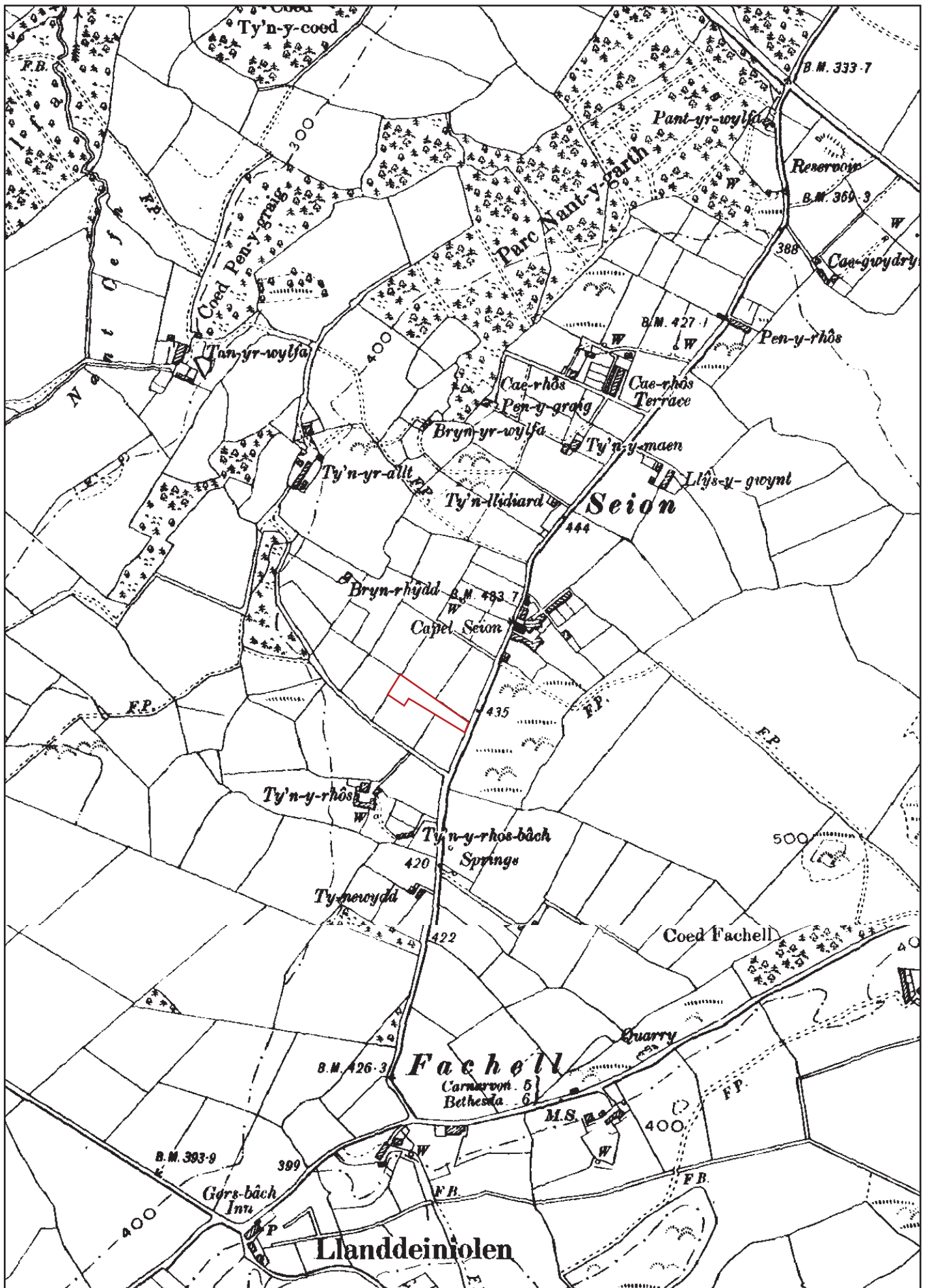


Figure 05: Caernarvonshire County Series 25 inch map Sheet XI.1 Second (1901) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.

## **FIGURE 06**

**Caernarvonshire County Series 25 inch map Sheet XI.1 Third (1920)  
Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents  
boundary of the proposed Waste Water Treatment Works.**

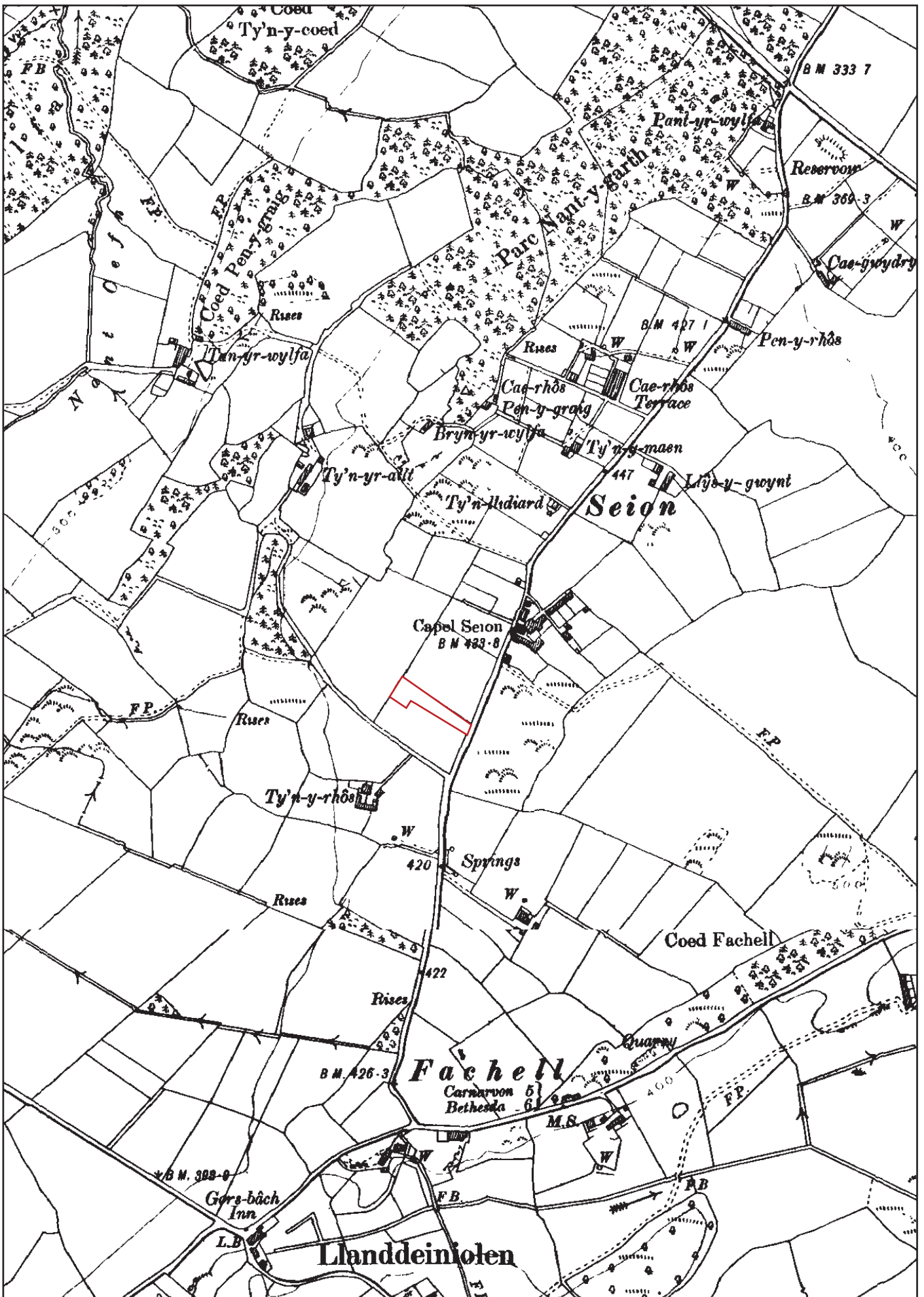


Figure 06: Caernarvonshire County Series 25 inch map Sheet XI.1 Third (1920) Edition Ordnance Survey. Scale 1: 6,500 @ A4. Red outline represents boundary of the proposed Waste Water Treatment Works.

## **APPENDIX I**

### **Gwynedd Archaeological Trust photographic metadata pro-forma**



APPENDIX II – Photographic Metadata for GAT Project G2563 Seion WWTW

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
45274	G2563_002	Seion_WWTW	WWTW Walkover Survey	View along eastern field boundary from entrance looking towards the entrance to Tyn Rhos	NNE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_003	Seion_WWTW	WWTW Walkover Survey	View from the highest part of the field towards the western corner showing the ground falling away	E	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_004	Seion_WWTW	WWTW Walkover Survey	Proposed WWTW location in northern corner of field	SE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_006	Seion_WWTW	WWTW Walkover Survey	View along western field boundary towards location of proposed WWTW	SW	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_007	Seion_WWTW	WWTW Walkover Survey	View across field from its western corner showing the ground rising to the east	W	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_008	Seion_WWTW	WWTW Walkover Survey	View from the centre of the field towards proposed WWTW location in northern corner	S	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_013	Seion_WWTW	WWTW Walkover Survey	View along eastern field boundary towards entrance from southern corner of field	SW	-	MSL	28/06/2018	Gwynedd Archaeological Trust	
45274	G2563_015	Seion_WWTW	WWTW Walkover Survey	View of entrance to field and route of proposed access road from the road side	SE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
	G2563_016	Seion_WWTW	Pipe route walkover survey	View of southern end of Field 1; entry point for proposed pipe routes 1 & 2	NNW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_017	Seion_WWTW	Pipe route walkover survey	Existing septic tank, Field 1	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_018	Seion_WWTW	Pipe route walkover survey	View of Field 1, proposed pipe route 1	ESE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_019	Seion_WWTW	Pipe route walkover survey	View of Field 1, proposed pipe route 1	WNW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71209	G2563_021	Seion_WWTW	Pipe route walkover survey	Field 3 remnants of slate and wire fencing, proposed pipe routes 1 & 2	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_023	Seion_WWTW	Pipe route walkover survey	View of Field 3, proposed pipe route 2	W	-	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_025	Seion_WWTW	Pipe route walkover survey	New fence and gate between Fields 1 & 2	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_026	Seion_WWTW	Pipe	View of southern edge of Field	E	1x1m	Stuart	03/07/2018	Gwynedd	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			route walkover survey	2, proposed pipe route 1			Reilly		Archaeological Trust	
71210	G2563_030	Seion_WWTW	Pipe route walkover survey	Feature 3 - clawdd - Field 2, proposed pipe route 1	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_032	Seion_WWTW	Pipe route walkover survey	Northwest corner of Field 5, Feature 3, proposed pipe route 1	NNW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_033	Seion_WWTW	Pipe route walkover survey	Southwest corner of Field 5, Feature 3, proposed pipe route 1	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_034	Seion_WWTW	Pipe route walkover survey	View of Field 5, proposed pipe route 1	SSW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71211	G2563_036	Seion_WWTW	Pipe route walkover survey	North face of Feature 4, Field 5, proposed pipe route 1	NNE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71211	G2563_038	Seion_WWTW	Pipe route walkover survey	Feature 4, Field 6 and point of break for proposed pipe route 1	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71211	G2563_039	Seion_WWTW	Pipe route	Feature 4, Field 5 and point of break for proposed pipe route	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological	



PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			walkover survey	1					Trust	
71211	G2563_040	Seion_WWTW	Pipe route walkover survey	Feature 4, Field 5 and point of break for proposed pipe route 2	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_041	Seion_WWTW	Pipe route walkover survey	Field 4 for Proposed pipe route 2	W	-	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_042	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 6	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_043	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through Field 6	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_045	Seion_WWTW	Pipe route walkover survey	Southeast corner of Field 6, proposed pipe route 2	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_046	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through Field 6	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71212	G2563_047	Seion_WWTW	Pipe route walkover	Feature 5, disturbance for new gate, Field 6	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			survey							
	G2563_049	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through gates at northwest corner of Field 6	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_050	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 6	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_051	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 6 (western edge)	SW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_052	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 6	NNE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_053	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 6	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_055	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 7	N	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_056	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 7	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
	G2563_057	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 3 through Field 7	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_058	Seion_WWTW	Pipe route walkover survey	Exit point for proposed pipe route 1 through Field 7	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_061	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 8	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_062	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 8	SW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_063	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 8	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_064	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 9	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_065	Seion_WWTW	Pipe route walkover survey	Exit point for proposed pipe route 1 through Field 9	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_067	Seion_WWTW	Pipe	Proposed pipe route 3 exit	NW	1x1m	Stuart	03/07/2018	Gwynedd	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			route walkover survey	from Field 7			Reilly		Archaeological Trust	
56143	G2563_075	Seion_WWTW	Pipe route walkover survey	South face of Feature 12	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
56143	G2563_076	Seion_WWTW	Pipe route walkover survey	Close-up of metal sign on Feature 12	S	-	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
56143	G2563_079	Seion_WWTW	Pipe route walkover survey	Close-up of west face of Feature 12	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71216	G2563_080	Seion_WWTW	Pipe route walkover survey	Terminal point of Feature 9, proposed pipe route 3	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
71216	G2563_081	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 3 through Feature 9/garden of Tan-ur-Wylfa	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_082	Seion_WWTW	Pipe route walkover survey	Entry point into Field 12, proposed pipe route 3	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_083	Seion_WWTW	Pipe route	Proposed pipe route 3 through Field 12	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			walkover survey						Trust	
	G2563_086	Seion_WWTW	Pipe route walkover survey	Proposed pipe route through Field 13	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_087	Seion_WWTW	Pipe route walkover survey	Proposed pipe route through Field 13	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_088	Seion_WWTW	Pipe route walkover survey	Proposed pipe route through Field 13	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_089	Seion_WWTW	Pipe route walkover survey	Terminal of proposed pipe route 3 in Field 13	E	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_090	Seion_WWTW	Pipe route walkover survey	Terminal points of proposed pipe routes 1 & 2 in Field 3	NNE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_091	Seion_WWTW	Pipe route walkover survey	Exit point from Field 11 for proposed pipe route 1	N	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_092	Seion_WWTW	Pipe route walkover	Exit point from Field 11 for proposed pipe route 2	N	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			survey							
	G2563_093	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through Field 14	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_094	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 exit point from Field 14	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_095	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through Field 15	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_096	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 2 through Field 15	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
	G2563_097	Seion_WWTW	Pipe route walkover survey	General view of Field 15	SW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	
45274	G2563_010	Seion_WWTW	WWTW Walkover Survey	View of field entrance and gateway to adjoining field to the north	W	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 01
45274	G2563_011	Seion_WWTW	WWTW Walkover Survey	Proposed WWTW location in northern corner of field	SE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 02
45274	G2563_005	Seion_WWTW	WWTW Walkover	View along northern field boundary towards entrance	NW	-	MSL	28/06/2018	Gwynedd Archaeological	Plate 03

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			Survey	along proposed access road route					Trust	
45274	G2563_001	Seion_WWTW	WWTW Walkover Survey	View along northern field boundary from entrance along route of proposed access road towards treatment plant location	SE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 04
45274	G2563_012	Seion_WWTW	WWTW Walkover Survey	View along southern field boundary towards lower western corner of field	SE	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 05
45274	G2563_014	Seion_WWTW	WWTW Walkover Survey	Close up view of field entrance and clawdd wall field boundary on eastern side of field	NW	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 06
45274	G2563_009	Seion_WWTW	WWTW Walkover Survey	Wetter ground in northern corner of field	S	-	MSL	28/06/2018	Gwynedd Archaeological Trust	Plate 07
	G2563_031	Seion_WWTW	Pipe route walkover survey	General shot of Fields 1, 2 and 3 (taken from Field 2); proposed pipe route 1	NNW	-	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 08
	G2563_024	Seion_WWTW	Pipe route walkover survey	View of Field 3, proposed pipe route 2	E	-	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 09
	G2563_035	Seion_WWTW	Pipe route walkover survey	Manhole cover adjacent to Feature 4, Field 5	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 10

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
	G2563_020	Seion_WWTW	Pipe route walkover survey	South field boundary of Field 1, proposed pipe route 1	NNW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 11
71209	G2563_022	Seion_WWTW	Pipe route walkover survey	Field 3 remnants of slate and wire fencing, proposed pipe routes 1 & 2	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 12
28870	G2563_027	Seion_WWTW	Pipe route walkover survey	Well - Feature 2, proposed pipe route 1	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 13
28870	G2563_028	Seion_WWTW	Pipe route walkover survey	Interior of well - Feature 2, Field 2, proposed pipe route 1	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 14
71210	G2563_029	Seion_WWTW	Pipe route walkover survey	Feature 3 - clawdd - Field 2, proposed pipe route 1	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 15
71211	G2563_037	Seion_WWTW	Pipe route walkover survey	Close-up of north face of Feature 4, Field 5	NNE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 16
71212	G2563_044	Seion_WWTW	Pipe route walkover survey	Feature 5, southern field boundary of Field 6	N	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 17
	G2563_048	Seion_WWTW	Pipe	Proposed pipe route 2 through	SE	1x1m	Stuart	03/07/2018	Gwynedd	Plate 18



PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			route walkover survey	Field 6			Reilly		Archaeological Trust	
71213	G2563_054	Seion_WWTW	Pipe route walkover survey	Exit point for proposed pipe route 1 through Feature 6	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 19
71214	G2563_059	Seion_WWTW	Pipe route walkover survey	Feature 7 (lane)	S	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 20
71214	G2563_060	Seion_WWTW	Pipe route walkover survey	Feature 7, eastern clawdd	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 21
71215	G2563_066	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 1 through Field 10	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 22
71216	G2563_068	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 3 access to Feature 9	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 23
71216	G2563_069	Seion_WWTW	Pipe route walkover survey	Proposed pipe route 3 through Feature 9	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 24
71216	G2563_072	Seion_WWTW	Pipe route	Proposed pipe route 3 through Feature 9	NE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological	Plate 25

PRN*	PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	PLATES
			walkover survey						Trust	
71217	G2563_071	Seion_WWTW	Pipe route walkover survey	Location of Feature 10, set within Feature 9, proposed pipe route 3	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 26
71217	G2563_070	Seion_WWTW	Pipe route walkover survey	Close-up of Feature 10, proposed pipe route 3	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 27
71218	G2563_073	Seion_WWTW	Pipe route walkover survey	Southwest face of Feature 11, proposed pipe route 3	SSW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 28
56143	G2563_074	Seion_WWTW	Pipe route walkover survey	Features 11 & 12 off proposed pipe route 3	SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 29
56143	G2563_077	Seion_WWTW	Pipe route walkover survey		SE	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 30
56143	G2563_078	Seion_WWTW	Pipe route walkover survey	West face of Feature 12	W	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 31
71219	G2563_084	Seion_WWTW	Pipe route walkover	Exit point from Field 12 (Feature 13), proposed pipe route 3	SES	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 32

<b>PRN*</b>	<b>PHOTO RECORD NUMBER*</b>	<b>PROJECT NAME</b>	<b>PROJECT PHASE</b>	<b>DESCRIPTION*</b>	<b>VIEW FROM</b>	<b>SCALE(S)</b>	<b>CREATOR OF DIGITAL PHOTO*</b>	<b>DATE OF CREATION OF DIGITAL PHOTO*</b>	<b>ORIGINATING ORGANISATION</b>	<b>PLATES</b>
			survey							
71219	G2563_085	Seion_WWTW	Pipe route walkover survey	Feature 13 in Field 12	NW	1x1m	Stuart Reilly	03/07/2018	Gwynedd Archaeological Trust	Plate 33



Gwynedd Archaeological Trust  
Ymddiriedolaeth Archaeolegol Gwynedd

Craig Beuno, Ffordd y Garth, Bangor, Gwynedd. LL57 2RT  
Ffon: 01248 352535. Ffacs: 01248 370925. email: [gat@heneb.co.uk](mailto:gat@heneb.co.uk)

