

# Ganol Outfall West Shore, Llandudno

## Archaeological Assessment



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Historic Environment Record Event Primary Reference Number 45398

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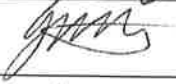
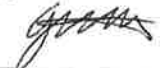
Front cover image: View of the intertidal area and outfall pipes from the West Shore (G2600\_003)

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Rev No.	Summary of Changes	Ref Section	Purpose of Issue
1	Spelling 'Gogarth'	Throughout	GAPS Approval
1	Incorrect numbering of features	4.1	GAPS Approval
1	Additional PRN for 'Boulder Field'	3.8, 3.9, 4.3	GAPS Approval

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## **CRYNODEB ANNHECHNEGOL**

*Gofynnodd Ymddiriedolaeth Archeolegol Gwynedd gan Arup I ymgymryd asesiad archeolegol fel rhan o Gais Trywydd Morol i waith morol yn gysylltiedig efo'r Ganol – Gorsaf Glan Gorllewin Dychlamo Carthion, Conwy. Mae'r cynllun awgrymedig yw uwchraddio'r bibell arllwysfa carthion sy'n bodoli ar y Traeth Glan Gorllewin, Llandudno oherwydd mae'r bibell arllwysfa 700mm tryfesur 1.1m hir sy'n dadlwytha'r llif storm ysbeidiol o'r Glan Gorllewin mewn stad anriparus.*

*Mae'r ardal o amgylch y Glan Gorllewin yn oludog mewn archaeoleg o'r oes cyn-hanesyddol hyd at gyfnod cyfoes. Tu fewn yr ardal cefnfor ei hun, mae yna dau hoenyn pysgod sydd yn gorchuddio gan bibell arllwysfa carthion o'r 19eg a 'i hadeiladwyd i gwathanethu'r tref gynyddol Llandudno.*

*Dynodwyd chwech nodwedd yn ystod yr asesiad seiliedig ddesg ac arolwg trost-cerdded, pedwar ohonynt sydd yn cael ei effeithio'n uniongyrchol gan bibelli Arllwysfa Ganol. Mae'r newidiadau amgylchedd morol a llif yn golygu mae'n bosib fod y nodweddion yma yn goroesi o dan y tywod a gallu cael ei diweddu yn ystod unrhyw waith atgyweiriad ymwthiol. Gan hynny mae'n awgrymedig fod briff gwyllo archeolegol gael ei ymgymryd yn ystod gwaith ategir pibell.*



## **NON-TECHNICAL SUMMARY**

*Gwynedd Archaeological Trust (GAT) has been asked by Arup to undertake an archaeological assessment as part of a Marine Licence Application for marine works associated with the Ganol - West Shore Sewage Pumping Station in Llandudno, Conwy. The proposed scheme is to upgrade an existing sewer outfall pipe on West Shore Beach, Llandudno as the existing 700mm diameter 1.1km long outfall pipe discharges the intermittent storm flows from West Shore and is in poor repair.*

*The area around the West Shore is rich in archaeology from the prehistoric through to the modern period. Within the foreshore area itself there are two medieval fish traps that are overlain by the 19<sup>th</sup> century sewer outfall pipes that were constructed to serve to the growing town of Llandudno.*

*Six features were identified during the desk based assessment and walk-over survey, four of which are directly affected by the Ganol Outfall pipes. The changing marine environment and inundation means that it is probable that these features survive under the sand and could be damaged during any intrusive repair work. It is therefore recommended that an **archaeological watching brief** is undertaken during the pipe repair works.*

# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Arup to undertake an archaeological assessment as part of a Marine Licence Application for marine works associated with the Ganol - West Shore Sewage Pumping Station in Llandudno, Conwy County Borough (NGR SH76688225; Post Code: LL30 2QZ; Figure 01). As specified in the current application documents, the proposed scheme is to upgrade an existing sewer outfall pipe on West Shore Beach, Llandudno. The existing 700mm diameter 1.1km long outfall pipe discharges the intermittent storm flows from West Shore and is in poor repair. The proposed works include repairing 6 known defects in the outfall, jetting of 1.3km of the outfall, and potential repair of the pipe in the first 330m if found to be incomplete. The scheme area is located on DCWW Drawing No. 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000, reproduced as Figure 01.

The aim of this archaeological assessment is to consider the impact of the proposals on proximity heritage assets as well as the potential for undiscovered features, with recommendations for appropriate mitigation, where applicable. The assessment is focused on the local intertidal area, incorporating the route of the outfall and immediate environs.

The assessment conforms to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014) and requirements of section 2.3 of MoRPHE (English Heritage 2015) and MAP2 (English Heritage, 1991, *Management of Archaeological Projects*). Submission of digital archive 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).

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER was contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER was informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project. The GAT HER Enquiry Number for this project is GATHER1068 and the Event PRN is 45398.

Gwynedd Archaeological Trust is certified to ISO 9001:2008 and ISO 14001:2004 (Cert. No. 74180/A/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).

The project was monitored by Gwynedd Archaeological Planning Service (GAPS).

## 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, Garth Road, Bangor, Gwynedd, LL57 2RT) was examined for information concerning the study area, defined as the local intertidal area, incorporating the route of the outfall and immediate environs shown on DCWW Drawing No. 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000 (Figure 01). All identified features were mapped, described and added to a gazetteer of sites and the relative importance of sites should be defined;
2. The National Monuments Record (NMR RCAHMW, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) was checked for sites additional to the HER.
3. Archive data, including primary and secondary sources, historic maps and estate maps were examined at the regional archives (Conwy Archive Service, Old Board School, Lloyd St, Llandudno LL30 2YG and Bangor University Archives and Special Collections, The Main Library, Bangor University, College Road, Bangor, Gwynedd, LL57 2DG), and the National Library of Wales, Penglais Rd, Aberystwyth SY23 3BU.
4. Aerial photographs from the Central Register of Aerial Photography, Welsh Assembly Government, Cardiff, were examined for potential features;
5. Light Detection and Ranging (LiDAR) data was 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 undertaken on 25/02/2019 and examined the local intertidal area, incorporating the route of the outfall and immediate environs as detailed on DCWW Drawing No. 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000 (Figure 01). The aim of the walkover survey was to identify all known and new archaeological features on the ground and accurately map and describe them on GAT pro-formas. The features were then added to the overall gazetteer and their relative importance defined. A photographic record was maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3100; resolution: 4608 × 3072 [10.2 effective megapixels]) and a photographic metadata archive completed (G2600\_001 to G2600\_029; cf. Appendix II), with images archived in TIFF format.

## 2.3 Gazetteer

A gazetteer has been compiled for all known and new sites within and within proximity to the specified route; the gazetteer includes the following:

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 RESULTS

### 3.1 Location and Geological Summary

The west shore at Llandudno lies at the foot of the Great Orme and is an area of foreshore and esturine sand flats located within the Creuddyn and Arllechwedd Historic Landscape Character Area.

The bedrock geology at the west shore is Llanarmon Limestone Formation – Dolostone which is a sedimentary bedrock formed during the Carboniferous Period. This is overlain by Coastal Zone Deposits (undifferentiated) – Sand, Silt and Clay and were formed up to 2 million years ago in the Quaternary Period. These deposits are shallow marine in origin and consist of coarse-grained material that forms beaches and bars in a coastal setting (British Geological Survey 1:50,000).

Three Fish-tail groynes (breakwaters) were installed on the West Shore in 1991 in order to protect the sea wall and increase beach levels in the area. These have been successful in protecting the sea wall but have failed to raise the beach level (Bull *et.al*, 1998). This study notes how the site formation processes are controlled by the tidal flows and particularly the scouring effect of the ‘Northern Channel’ (*ibid.*).

### 3.2 Statutory and Non-Statutory Designations

There are no Scheduled Monuments (SM) within the foreshore area surrounding the Ganol Outfall pipes. The nearest SM is close to the north of the study area and is the Gogarth Grange, Bishop's Palace (PRN 813, NGR SH76058290; SM CN093) which is a hall type structure consisting of two blocks and dating to the 13<sup>th</sup> Century (Evans, R. 2004). There are two listed buildings

There are two Listed Buildings located in close proximity to the shore and the start of the outfall pipe system. The first of these is West Lodge, a later 19<sup>th</sup> Century toll lodge located at the end of marine drive, which is built from stone with embattled parapets and mock machicolation (Cadw Listed Building, 5815). The second listed building is the White Rabbit Memorial (Cadw Listed Building, 3510), located at the north end of the pool on the west shore, which dates to the early 20<sup>th</sup> Century and commemorates links between Alice Liddell (the inspiration for Alice in Wonderland) and Llandudno.

Ref Number	Name	PRN	Easting	Northing	Grade
CN093	Gogarth Grange, Bishop's Palace	813	276067	382898	SM
5815	West Lodge	20729	276850	382284	II
3510	White Rabbit Memorial	15455	277065	382093	II

The study area lies within the Creuddyn and Conwy *Landscape of Outstanding Historic Interest in Wales* (Cadw/ICOMOS 1998, 84-87), which is described as containing a 'highly diverse land use and settlement from the early prehistoric period to the present [and] a planned Victorian resort town (*ibid.* 87).

The study area lies within Area 1 of the Creuddyn and Arllechwedd Historic Landscape Characterisation area, the Great Orme (PRN 15823) which is a limestone headland rich in archaeology particularly evidence related to copper mining (Davis & Thompson, 1999).



### 3.3 Environmental Remains and Soil Morphology

The potential for the recovery of environmental remains is thought to be **high** if the remains of the Gogarth Fish Traps are encountered during the repair works. They could provide samples of wood for dendrochronology and radiocarbon dating, along with potential for further environmental remains. A sample of wood recovered from the west fish trap (PRN 14611, Feature 01) was sent for analysis by N. Bannerman and was identified as Alder (*Alnus*) and returned a radiocarbon date of around 1500 A.D. (cal.) (Bannerman, 2001). During the walk-over survey 4 wooden stakes were noted running SW from the 1845 outfall pipe (Feature 05).

The full detail of the soil morphology remains unknown at this stage but it is likely to consist of a combination of sand, silt and clay typical of coastal marine deposits.

## 3.4 Historical and Archaeological Background

### 3.4.1 Introduction

The west shore at Llandudno lies at the foot of the Great Orme and is an area of foreshore and estuarine sand flats located within the Creuddyn and Arllechwedd Historic Landscape Character Area. Llandudno town underwent a period of massive development during the mid- 19<sup>th</sup> century including the development of a sewer system of which the Ganol Outfall pipes are a major part.

### 3.4.2 Prehistoric and Roman Background

Evidence of prehistoric activity is abundant on the Great Orme at Llandudno. Four human skeletons and animal bones, dating to the Upper Palaeolithic period, were discovered at Kendrick's cave (SH77988281) in the late 19<sup>th</sup> century along with a polished stone axe and some fragments of flint. There is also evidence for Neolithic activity on the Orme evidenced by the burial chamber at Llety's Filiast. Kendrick's Upper Cave (SH78008284) provides evidence for settlement on the Orme during the Bronze Age, a time when the copper ore of the Orme had been identified and exploitation of this resource had begun (Gwyn & Thompson, 1999).

The Pen y Dinas promontory fort (SH77908295) dates to the Iron Age period and contains numerous hut circles and is an excellent example of how the natural landscape could be exploited when creating a hillfort. There is some evidence for Roman occupation in the area including the Roman copper cakes discovered at Bryn Euryn (*ibid*).

A partially polished axe-head made from Graig Lwyd stone was found on the shingle beach at the West Shore high water mark in 1952. It is likely that this artefact had originally been deposited on land and has ended up on the beach due to coastal erosion. Riley & Smith noted in their coastal erosion survey that the West Shore at Llandudno is "suffering medium erosion" and that the Great Orme in the Gogarth area is "suffering major to severe erosion" (Riley & Smith, 1993).

### *3.4.3 Medieval Background*

The manor of Gogarth on the Great Orme was first granted by Edward I in 1279 to Bishop Anian I. The Bishop's manor was made up of three townships in Llandudno, Gogarth in the south, the area below the Orme and the northern part of the Orme near St Tudno's church (Evans, 2004). It is at Gogarth that a substantial hall house was built consisting of two blocks. Block A dates to the 13<sup>th</sup> century and consists of a single stone built chamber with block B, a large hall and ancillary rooms, being added during the 14<sup>th</sup> century (Davidson, 2001). It would appear that the Bishop's occupation in Gogarth was short lived as within 200 years Leland describes the "ruines of a Place of the Bishops of Bangor" although they did retain the ownership of the manor lands until 1894 (Ibid).

On the West Shore there are two fish traps dating to the medieval period known as Gogarth West (PRN 14611, Feature 01) and Gogarth East (PRN 14612, Feature 02) and sample of wood from Gogarth West has produced a date of 1500 (cal) (Bannerman, 2001). The foreshore area was part of the Bishops manor and it is hard to imagine that they did not profit in some way from activities undertaken on their land.

### *3.4.4 Post Medieval and Modern*

The manor of Gogarth was leased to the Mostyn family from the mid-16<sup>th</sup> century through till the 19<sup>th</sup> century and this period was marked by the enclosure of lands, so much so that the Bishop of Bangor registered a complaint in the Episcopal survey of 1680 (Evans, 2004). The exploitation of the copper ore on the Orme continued in this period but fluctuations in the price of copper would make the smaller concerns uneconomic (Gwyn & Thompson, 1999).

In the mid-19<sup>th</sup> century the development of Llandudno into a holiday resort began in earnest under the influence of the Mostyn Estate, with a planned street system which is characterised by wide boulevards and sea views and extended to the West Shore (Wynne Jones, 1975). The influx of people to the area necessitated an improved sewerage system with the Ganol Outfall pipes being constructed in 1845 & 1876 (Bannerman, 2001). The development of the town can be seen by comparing the tithe map with the 3 editions of the Ordnance Survey 25 inch County map of Caenarfonshire, Sheet I.16 (Figures 2-5).

The risk of invasion during the Second World War resulted in the construction of coastal gun emplacements, the closest of which was at NGR SH 76888224 (PRN 24734).

### 3.5 Cartographic Evidence

The 1839 Map of Sea Beach in the Parish of Llandudno (Bangor Archives, Mostyn 1166) shows has little detail but it does have 'sluice' marked in the general area of the present outfall system showing that the area had a history of being used for the control of excess water. The tithe map of the parish of Llandudno, 1845 (National Archives; Figure 02) shows the landowner of the foreshore at West Shore as the Bishops of Bangor but the apportionment notes 'for the time being' even though the lands will not be officially sold until 1894 (Davidson, 2001). It is clear from looking at this pipe that the town of Llandudno was beginning to develop during the mid-19<sup>th</sup> century and that the Mostyn family were the predominant landowners. This is reinforced by looking a map showing the planned leasehold sale of Mostyn lands in Llandudno in 1849 (Bangor Archives, 3/179 Misc). This map also has the route of a proposed main sewer marked which terminates near the site of the Ganol Outfall pipes. However, the orientation of the pipeline is inconsistent with the current outfall.

The Llandudno Sewerage maps and plans from 1911 show details of further surface water works at the West shore further to the south than the Ganol Outfall system (Conwy Archives, C/Maps and Plans 5/1/25/8 & 5/1/25/14).

The 25 inch 1<sup>st</sup> edition Ordnance Survey map of 1890 (Figure 03), Sheet I.16 shows the outfall system but it is only labelled 'pipe' rather than 'pipes' which appears on the following editions. It is believed however that both pipes were in existence by this time. When examining the 1890, 1900 and 1913 editions together is it clear that the route of the 'Northern Channel' that runs across the West Shore is moving further to the north (Figures 3-5).

### **3.6 Artefact Potential**

The potential for the recovery of artefacts is considered to be low due to the limited nature of the ground works and their intertidal location within areas of shifting sand. However due to coastal erosion and tidal action it is still possible for artefacts to be discovered on the foreshore for example the prehistoric stone axe (PRN 4589), although they are unlikely to be encountered in significant archaeological contexts.

### 3.7 Aerial Photographs and Lidar

Five aerial photographs of the study area were examined dating from 1948 to 1990. These show the outfall pipes but not the Gogarth fish traps (Features 01 & 02). A full list of photographs consulted can be seen in the bibliography. Image RAF541/38 frame 3001 taken on the 21/05/1948 (Figure 6) shows the outfall pipes almost entirely covered in sand over two thirds of their length and the 1845 pipe connected at a 45 degree angle to the longer 1876 pipe. The path of the 'Northern channel' can also be clearly seen running across the beach to the SW of the pipes approximately 200m further south than the course it takes today. The other images dating to 1965, 1970 and 1990 clearly show the scouring action the tidal waters have on the foreshore with various sections of the pipes appearing and disappearing in the images. In all the images the pipes appear to be connected at the seaward end and the Quarry Jetty (Feature 04) is clearly visible.

It would appear that Nigel Bannerman took the only known aerial photograph to show the Gogarth Fish Traps during the lowest usable tide of 1996 (Bannerman, N. & Bannerman, D. 2001; Figure 7). By 1996 the 'Northern Channel' was running alongside the 1845 pipe with the scouring effect it produced revealing the fish traps.

Light Detection and Ranging (LiDAR) data was examined, obtained 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 at 1m interval. No new or existing archaeological features were identified on the images which also do not show the outfall pipes due to the images being taken during a high tide.

### 3.8 The Walkover Survey

The walk-over survey was undertaken on the 25/02/2019 and was timed so that the seaward end of the pipeline was reached at the lowest point of the tide, 9.02am. The tide height was 1.0m when referenced to Mean Lower Low Water. Weather conditions were clear and bright and ideal for the survey work.

The study area was a predominantly sandy foreshore with evidence for various water channels running across the beach (Plate 01). Approximately the first 300m of the 1876 outfall pipe and 400m of the 1845 pipe lie beneath the current beach level. The first evidence of the 1876 pipe was a series of metal supports which stand approximately 0.5m above the level of the beach (Plate 02). These supports are not in the original design for the 1876 pipe (Figure 8) and therefore must be a later repair though the date of this is unknown. At the end of the 1845 pipe there is evidence of the two pipes being previously connected although all that remains is one pipe section encased in concrete, and the 45 degree angle offshoot from the 1876 pipe (Plates 03 & 04). It is also at this section of the 1876 pipe that the original wooden pipe superstructure survives (Figure 8), although the majority of the metal pins which secured the wooden cross beams have now been lost and the beams encrusted in place (Plate 05).

The movement of material by tidal action can clearly be seen within the study area with large amounts of stone collecting both between the pipes and to the South of the 1845 pipe (Plate 06 & 07). The repairs undertaken in 2013 are clearly visible at various locations along the length of the 1876 pipe (Plate 08). This repair work was undertaken under an archaeological watching brief by L-P Archaeology (Jones, 2013) which noted no archaeological assets at any of the repair sites.

No evidence for the Gogarth West fish trap (PRN 14611; Feature 01) was noted during the walk-over survey and due to the present location of the 'Northern Channel' it is unlikely to be seen other than during a spring tide. The Gogarth East fish trap (PRN 14612; Feature 02) was also not clearly visible during the walk-over survey, however a linear 'boulder field' (PRN 77209; Feature 06) was noted running in a SW direction out from the 1845 pipe which could be related to this asset. It is situated in the correct location (in close proximity to the footbridge) and is the only area noted where boulders lead out into the 'Northern Channel' (Plate 09). However, it is also possible that this represents part of the possible causeway identified by Bannerman (Figure 10).

Approximately 15m to the East of the footbridge a line of wooden stakes (PRN 77164; Feature 05) were noted running SW from the 1845 pipe (Plate 10). Four stakes were clearly visible above the current beach level but it is entirely possible that more survive under the sand. The stakes are spaced approximately 2.5m apart and a maximum of 0.25m protrudes from the beach. It is possible that these stakes are related to the Gogarth East fish trap due to their proximity to its presumed location, however, the spacing between the stakes suggests it is a different type of fish trap where a net is hung between a line of posts (Bannerman, *pers. comm.*). The stakes are also located next to a large slab of concrete attached to the 1845 pipe. This is presumed to be an early repair attempt to the older pipe (Plate 11).

To the north of the study area survive the remains of a jetty (PRN 77163; Feature 04) which is presumed to be post-medieval and related to the nearby quarrying locations (Plate 12). It is thought that material from the nearby quarries (PRNs 15454 & 15455) was moved through an archway under Marine Drive and loaded via this jetty (Bannerman, 2001). The surviving remains consist of a c.40m long x 6m wide bank of pebbles and stones with two parallel lines of wooden stakes running down the centre (14 stakes in total visible). Stakes survive to c.0.3m in height and are spaced 1m apart (parallel to the coastline) and 2m apart (perpendicular to the coastline) (Plate 13). The jetty runs in a south westerly direction perpendicular to the coastline (Plate 14).



### 3.9 Gazetteer of Features

All the features noted below are shown on Figure 9 with green dots numbered (gazetteer of features). All the recommendations are based on the current understanding of the scheme proposals and their impact on the features. In the event of alterations to the scheme, the recommendations might have to be revisited. A reproduction of an illustration of the location of the Gogarth fish traps (Features 01 & 02; Figure 10) has been included as these sites were not seen during the walk-over survey.

<b>Feature Number</b>	01
<b>Site Name</b>	Gogarth West, Llandudno
<b>PRN Number</b>	14611
<b>Grid Reference</b>	SH75958240
<b>Period</b>	Medieval
<b>Site Type</b>	Medieval Fish Weir
<b>Assessment Category</b>	B
<b>Description</b>	<p>A 5m wide bank of stones running at about 45 degrees to the shore with an arm running back towards the shore for about 20m. Only the outer 100m of the trap can be seen, with the inner end of the trap is still buried by sand retained by the sewage pipes. N. Bannerman has recovered wooden stakes from the weir which produced radiocarbon dates of 1460. (Hopewell, 2000).</p> <p><b>This site was not visible during the walkover survey.</b></p>
<b>Impact</b>	Likely
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Watching Brief

<b>Feature Number</b>	02
<b>Site Name</b>	Gogarth East, Llandudno
<b>PRN Number</b>	14612
<b>Grid Reference</b>	SH76308230
<b>Period</b>	Medieval
<b>Site Type</b>	Medieval Fish Weir
<b>Assessment Category</b>	B
<b>Description</b>	<p>Close to and similar to Gogarth West. Visible as a 0.2m high and 4m wide bank of pebbles and some larger stones. The site is visible beyond the large sewage pipe that runs from the west shore. The pipe has retained a depth of sand on the inner shore and the trap presumably continues to the shore beneath the sand. The visible part of the weir extends out into the river channel for c. 80m at roughly 90 degrees to the shore (Hopewell, 2000)</p> <p><b>This site was not visible during the walkover survey.</b></p>
<b>Impact</b>	Likely
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Watching Brief

<b>Feature Number</b>	03
<b>Site Name</b>	Findspot – Prehistoric Stone Axe
<b>PRN Number</b>	4589
<b>Grid Reference</b>	SH76708220
<b>Period</b>	Prehistoric
<b>Site Type</b>	Findspot
<b>Assessment Category</b>	None - findspot
<b>Description</b>	A partially polished axe-head of Graig Lwyd stone was found by Mr. D. Paterson in May 1952, lying on the shingle at approx. high water mark
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	None

<b>Feature Number</b>	04
<b>Site Name</b>	Quarry Jetty
<b>PRN Number</b>	77163
<b>Grid Reference</b>	SH7649682380
<b>Period</b>	Post Medieval
<b>Site Type</b>	Landing Point
<b>Assessment Category</b>	C
<b>Description</b>	c.40m long x 6m wide bank of pebbles and stones with two parallel lines of wooden stakes running down the centre (14 stakes in total visible). Stakes survive to c.0.3m in height and are spaced 1m apart (parallel to the coastline) and 2m apart (perpendicular to the coastline). Likely to be associated with the nearby Quarries (PRNS 15455 & 15454).
<b>Impact</b>	None
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	None

<b>Feature Number</b>	05
<b>Site Name</b>	Possible Fish Trap
<b>PRN Number</b>	77164
<b>Grid Reference</b>	SH7649882310
<b>Period</b>	Unknown
<b>Site Type</b>	Possible Fish Trap
<b>Assessment Category</b>	B
<b>Description</b>	4 wooden stakes spaced c.2.5m apart running in a SW direction from the 1845 outfall pipe. It is likely that more stakes are covered by the sand. These stakes could be associated with the Gogarth East fish trap (14612) but there is no definitive proof of this.
<b>Impact</b>	Likely
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Watching Brief

<b>Feature Number</b>	06
<b>Site Name</b>	Boulder Field – Possible fish trap or causeway
<b>PRN Number</b>	77209
<b>Grid Reference</b>	SH7634082344
<b>Period</b>	Unknown
<b>Site Type</b>	Possible Fish Trap or Causeway
<b>Assessment Category</b>	B
<b>Description</b>	Boulder field running in a SW direction from the 1845 outfall pipe. It is likely that more stones are covered by the sand and the water in the 'northern channel'. These stones could be associated with the Gogarth East fish trap (14612) but there is no definitive proof of this. It could also be a possible causeway (Bannerman, 2001).
<b>Impact</b>	Likely
<b>Recommendation for further assessment/evaluation</b>	None
<b>Recommendation for mitigatory measures</b>	Watching Brief

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Conclusion

The archaeological assessment noted that there are five archaeological assets located within the intertidal area four of which are likely to be affected by the repair work planned on the Ganol Outfall. Feature 01 and feature 02, the Gogarth medieval fish traps, although not seen during the walk-over survey, have been previously documented by both Hopewell and Bannerman and are likely to survive under the sand and the waters of the 'Northern Channel'. They are likely to be encountered during any excavations in the area. The other two assets likely to be affected by the repair work are the previously undocumented possible fish trap (Feature 05) and the boulder field (Feature 06) located to the south of the 1845 pipe, the full dimensions of which are unknown at present. The final asset (Feature 04), the quarry jetty, is situated far enough away from the pipeline to be considered unlikely to be affected.

### 4.2 Recommendations

It is considered that the intertidal location of the outfall would make the site unsuitable for further evaluation work. It is recommended that an intensive **archaeological watching brief** is undertaken during the repair works to the pipes of the Ganol Outfall, with an archaeologist present at all times when archaeologically sensitive ground disturbance is being carried out. This includes disturbance caused by bringing plant on and off the site. The fish-traps appear to be currently well protected by the sand, and it is recommended that as low impact as possible methods of repair works are carried out, in order to cause as little disturbance as possible to the surrounding archaeology.

### 4.3 Table of Features and Recommendations

Asset_No	PRN	Site_Name	Period	NGR	Recommendations for Further Assessment	Mitigation Recommendations
01	14611	Gogarth, West	Medieval	SH75958240	None	Watching Brief
02	14612	Gogarth, East	Medieval	SH76708220	None	Watching Brief
03	4589	Findspot, Stone Axe	Prehistoric	SH76708220	None	None
04	77163	Quarry Jetty	Post-Medieval	SH7649682380	None	None
05	77164	Possible Fish Trap	Unknown	SH7649882310	None	Watching Brief
06	77209	Possible fish trap or causeway	Unknown	SH7634082344	None	Watching Brief



## **5 ACKNOWLEDGEMENTS**

Thanks must go to Rob Evans who provided unflinching support, encouragement and along with the staff at the National Library of Wales, Bangor University Archives and Special Collections and the Conwy Archive Service, provided much archive and cartographic material in support of this project. Thanks must also go Philippa Wright who provided invaluable help with the oceanography aspects of the research.

Special thanks must go to Nigel Bannerman not only for his enlightening monograph on the history of the Great Orme but for his gracious permission to reproduce his aerial photograph and illustrations of the Medieval fish traps on the West Shore, Llandudno.

## 6 SOURCES CONSULTED

### 6.1 Primary Sources

#### Conwy Archives, Llandudno

C/Maps and Plans 5/1/1/3 *Elevation View of Outlet Pipes* 1874

C/Maps and Plans 5/1/25/14 *Surface Water Sewers* 1910

C/Maps and Plans 5/1/25/8 *Llandudno Sewerage Details re Surface Water Outfall, West Shore* 1911

Ordnance Survey 1<sup>st</sup> edition 25 inch Caernarvonshire County Series map of 1890. Sheet I.16

Ordnance Survey 2<sup>nd</sup> edition 25 inch Caernarvonshire County Series map of 1900. Sheet I.16

Ordnance Survey 3<sup>rd</sup> edition 25 inch Caernarfonshire County Series map of 1913. Sheet I.16

#### National Library of Wales

3/179 Misc *Plan of Llandudno and Environs* 29<sup>th</sup> August 1849

Mostyn 1166 *Map of Sea Beach in the Parish of Llandudno* 1839

#### Register of Aerial Photography, Welsh Assembly Government, Cardiff

#### *Vertical Images*

RAF 541/38 frame 3001 taken 21<sup>st</sup> May 1948

OS 65.181 WILD.687 taken 13<sup>th</sup> August 1965

OS/70 137 taken 19<sup>th</sup> May 1970

ZEISS 630 304.77 FILM 90-047 frames 111 and 113 taken 6<sup>th</sup> April 1990

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Gwyn, D. & Thompson, D. 1999. Historic Landscape Characterisation – Creuddyn & Arllechwedd. *Gwynedd Archaeological Trust Report No. 318*

Hopewell, D., 2000. An Assessment of Coastal Fish Weirs and Traps. *Gwynedd Archaeological Trust Report No. 363*

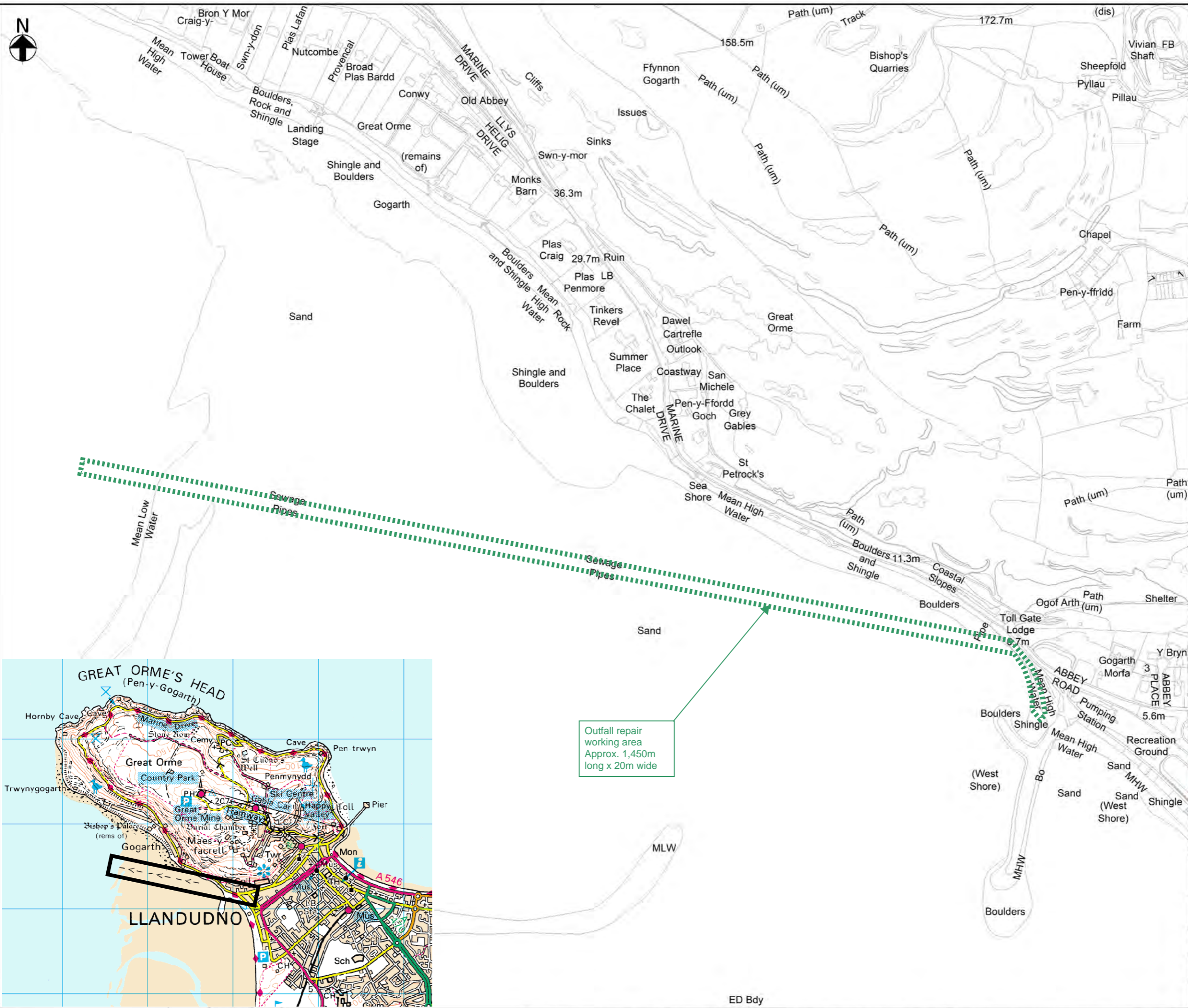
Jones, M. 2013. Report for Archaeological Monitoring at West Shore Outfall, Llandudno. *L-P Archaeology Report No: LP1518C-AWB*

Riley, H, & Smith, G. 1993 – Coastal Erosion Survey – Aberdaron Bay to the Great Orme. *Gwynedd Archaeological Trust Report No. 079*

Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*

Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014).

Figure 01: Reproduction of DCWW Drawing No.4591\_S\_202-ARP-XX-ZZ-DR-CX-06000;  
Scale 1:5000 @ A4



Outfall repair working area  
Approx. 1,450m long x 20m wide

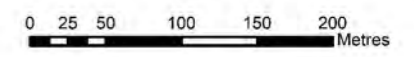
**KEY**

CONSTRUCTION WORKING AREA

**NOTES**

- Grid reference SH769821
- For details of all works to outfall onto the beach refer to drawing DCWW.4599.S.201-ARP-07-01-DR-CD-05101

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P1	22-10-18	AM	FOR INFORMATION	HM	DA	23-10-18
Rev.	Date	Drawn	Description	Chkd.	Appd.	Date

**Capital Delivery Alliance**  
**Cynghrair Cyflawni Cyfalaf**  
Ty Awen, Spooner Close, Coed Kernew, Newport, NP108FZ

Project Name: GANOL WEST SHORE SPS

Drawing Title: WEST SHORE SPS  
OUTFALL REPAIR  
OS PLAN

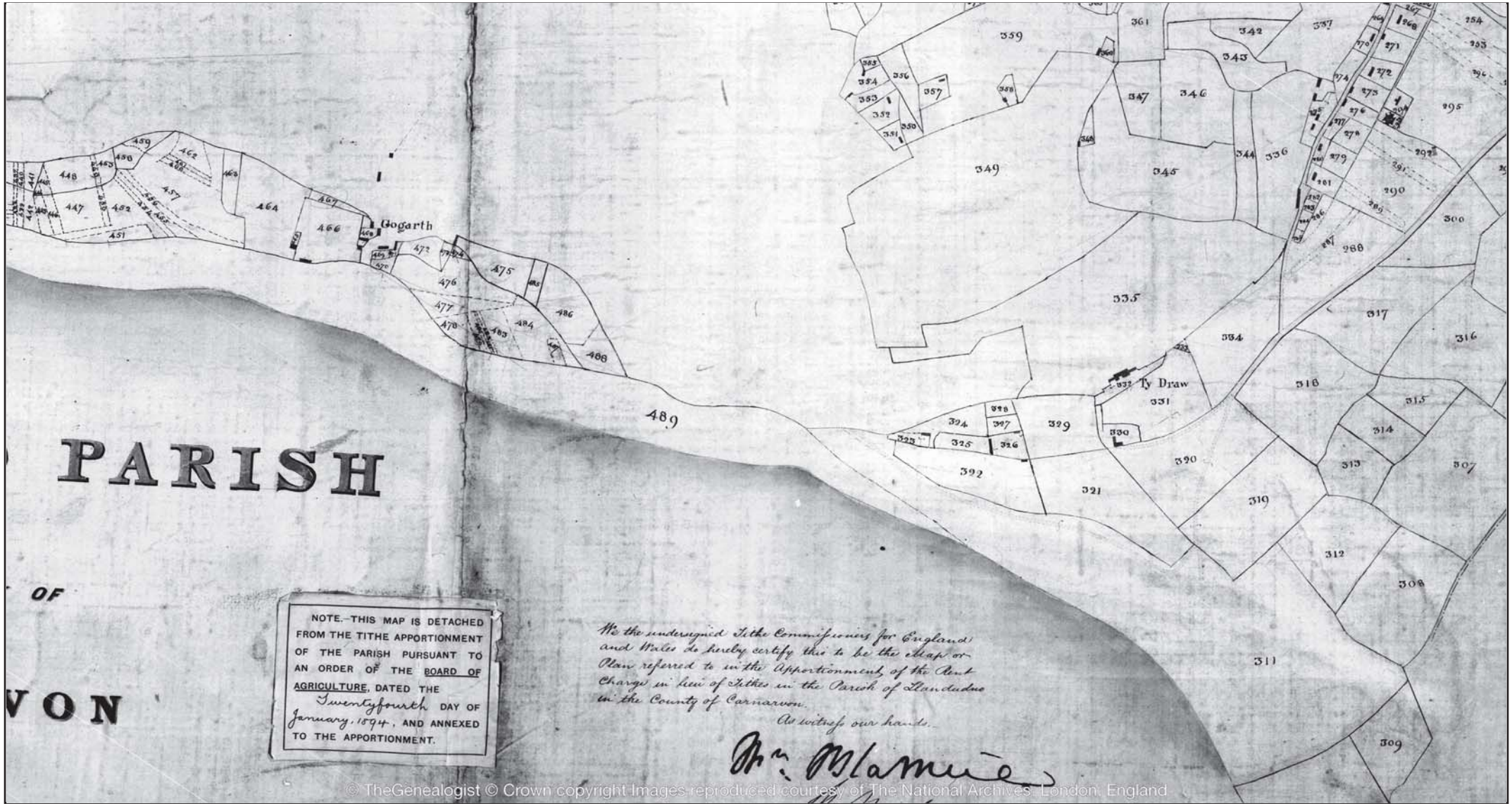
Suitability: FOR INFORMATION Suitability Code: S2

Originator: HM Designer: AM Date: 22-10-18

Internal Project Number: 241529 Scale: 1:5,000 Rev: P1

Drawing Number: 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000

Figure 02: West Shore section of the Tithe Map of the Parish of Llandudno, 1845



**PARISH**

OF  
**VON**

NOTE.—THIS MAP IS DETACHED FROM THE TITHE APPORTIONMENT OF THE PARISH PURSUANT TO AN ORDER OF THE BOARD OF AGRICULTURE, DATED THE *Twentyfourth* DAY OF *January, 1894*, AND ANNEXED TO THE APPORTIONMENT.

*We the undersigned Tithe Commissioners for England and Wales do hereby certify this to be the Map or Plan referred to in the Apportionment of the Rent Charge in lieu of Tithes in the Parish of Llandudno in the County of Carnarvon.*

*As witness our hands.*

*Wm. Williams*



Figure 03: First Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4, published in 1890. Scale: 1 to 5000@A4.

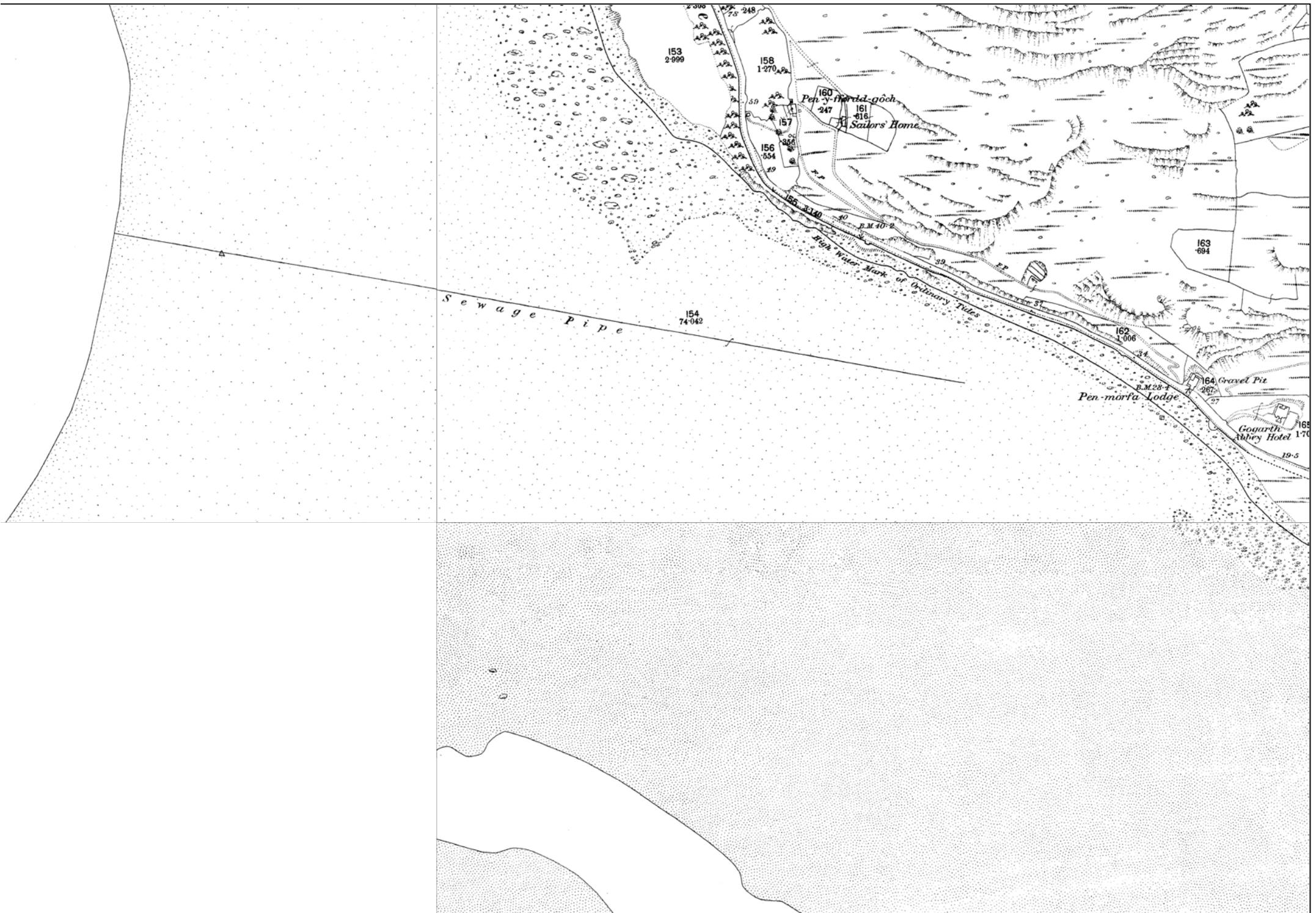


Figure 04: Second Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4, published in 1900. Scale: 1 to 5000@A4.

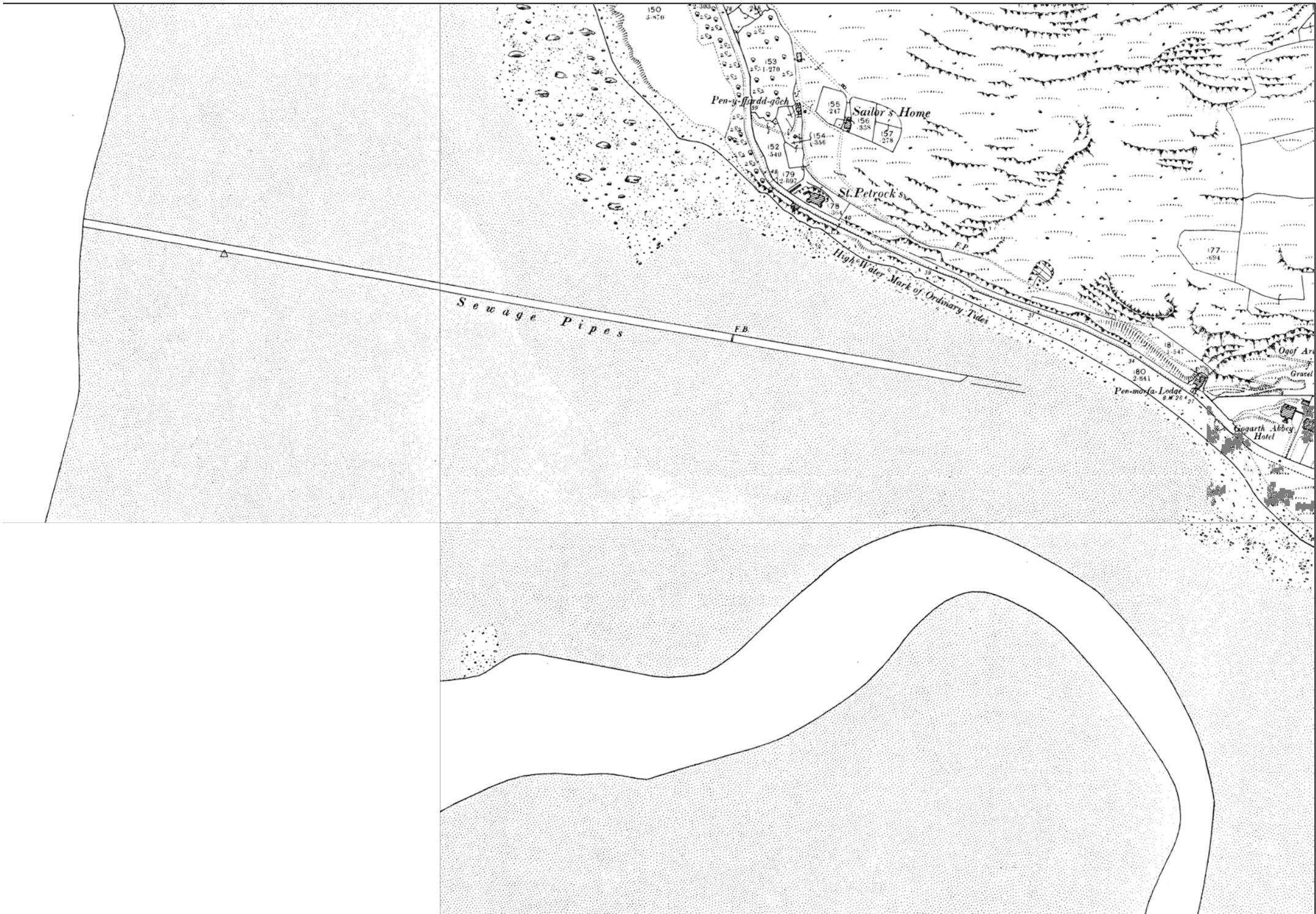


Figure 05: Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4, published in 1913. Scale: 1 to 5000@A4.



Figure 06: RAF 541/38 frame 3001 taken 21<sup>st</sup> May 1948

541/38. 21.5.48. F. 20" // 16.60

3001





Figure 07: Oblique aerial photograph of the Gogarth Fish Traps taken by Nigel Bannerman in 1996.



***Photo of the Gogarth fishtraps West shore Llandudno***

Figure 08: Elevation View of Outlet Pipes 1874 (C/Maps and Plans 5/1/1/3)

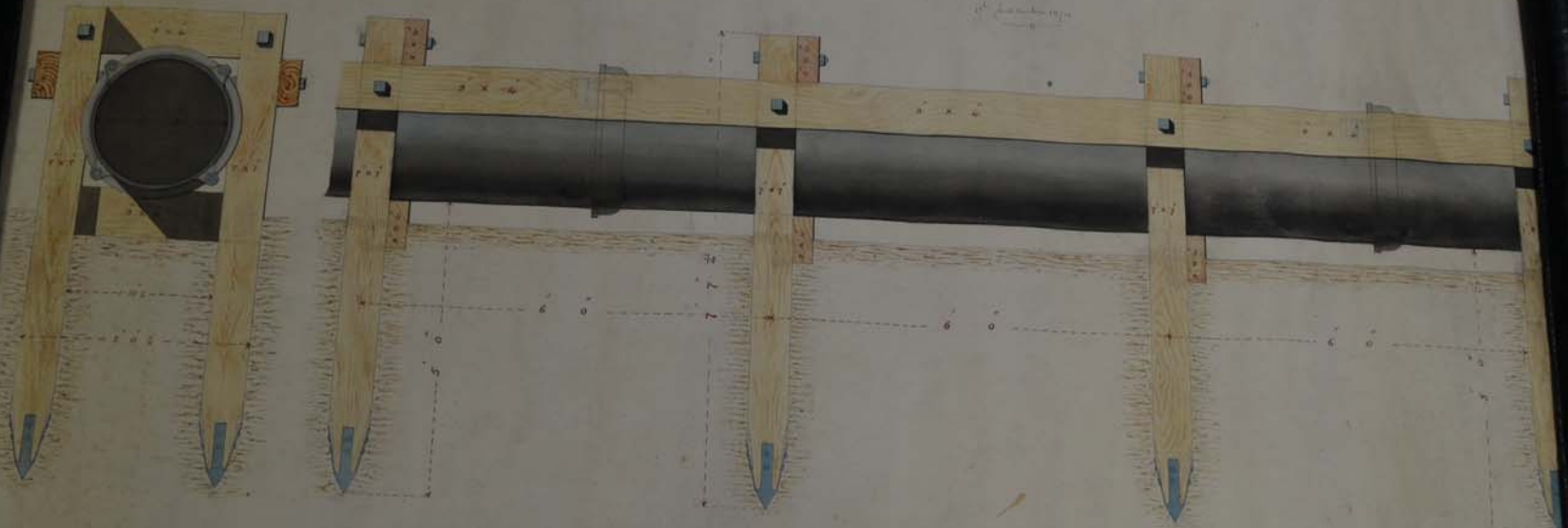
SHEET N<sup>o</sup> 6

THE ARCHITECTS 112, 113 & 114, W.C.

# LLANDUDNO SEWERAGE

## DETAILS OF OUTLET PIPES ACROSS THE SANDS

*W. & A. G. Architects  
112, 113 & 114, W.C.  
London, E.C. 4  
1892* *Depth 11 ft.*



Scale 1/2 Inch to one Foot



Figure 09: Location map showing features detailed in the gazetteer

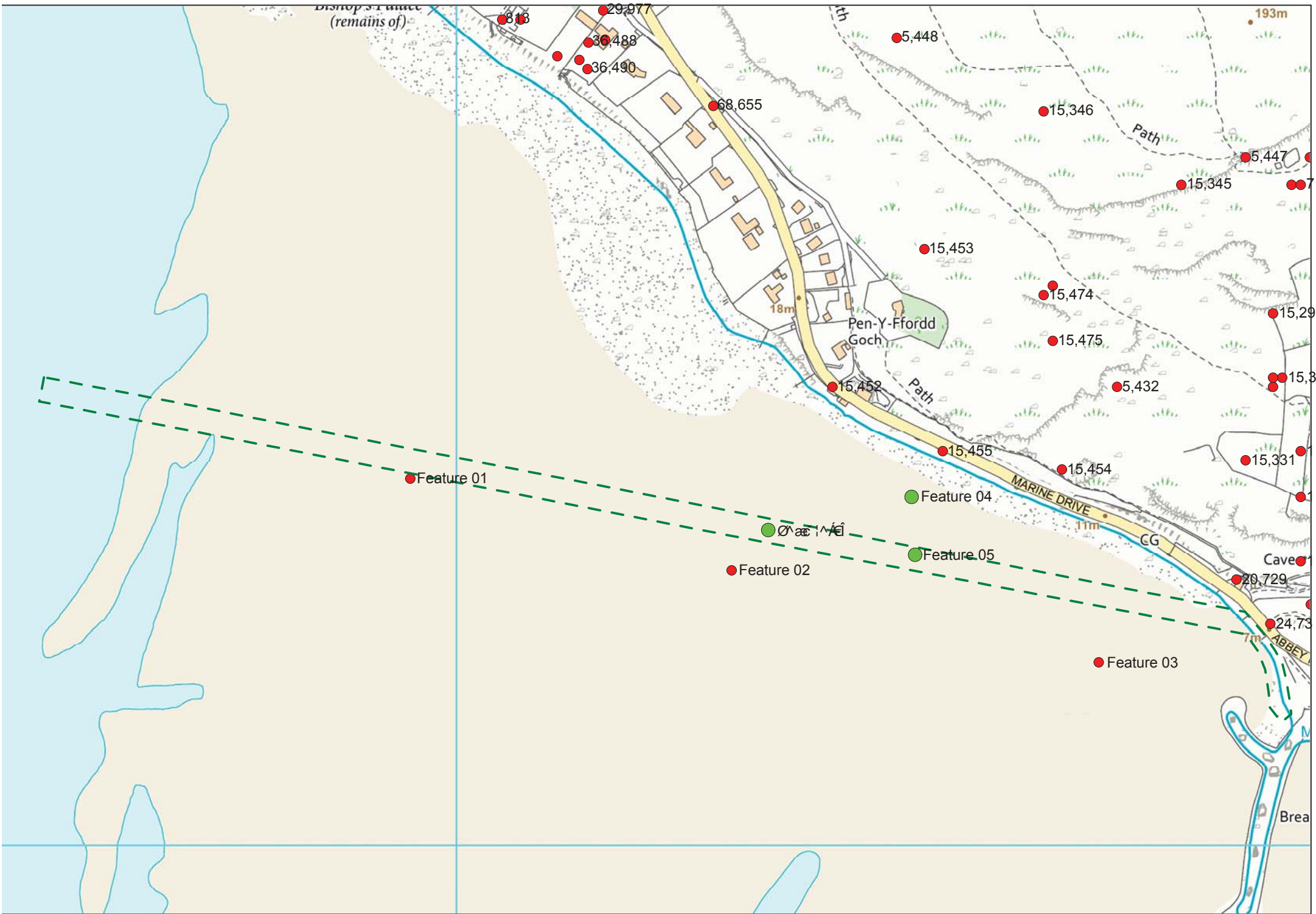


Figure 10: Reproduction of Bannerman's illustration showing the location of the Gogarth Fish Traps.

# The Lost Lands of Gogarth

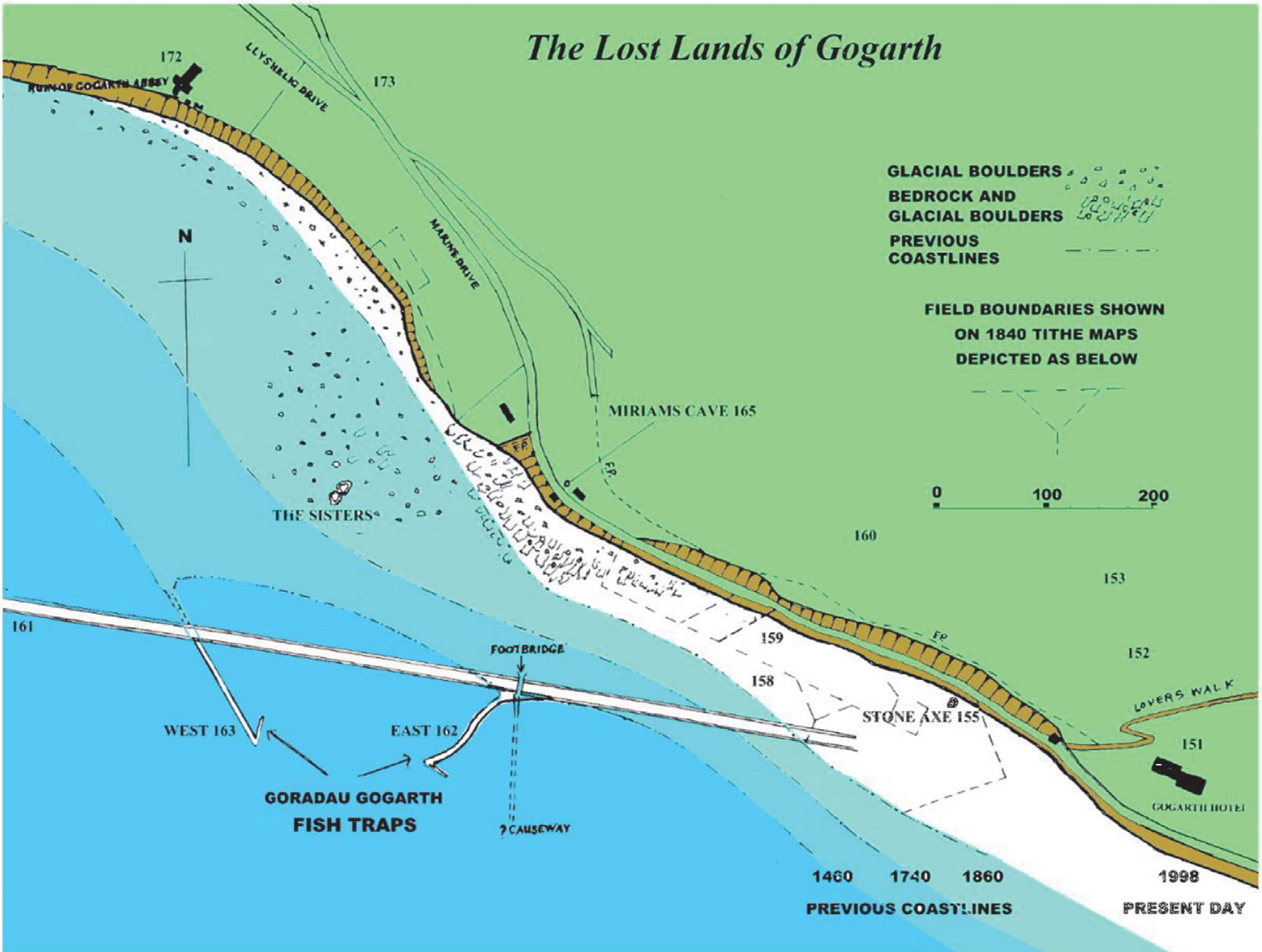






Plate 01: View of the outfall pipes from the shore; no scale: (archive reference: G2600\_002).

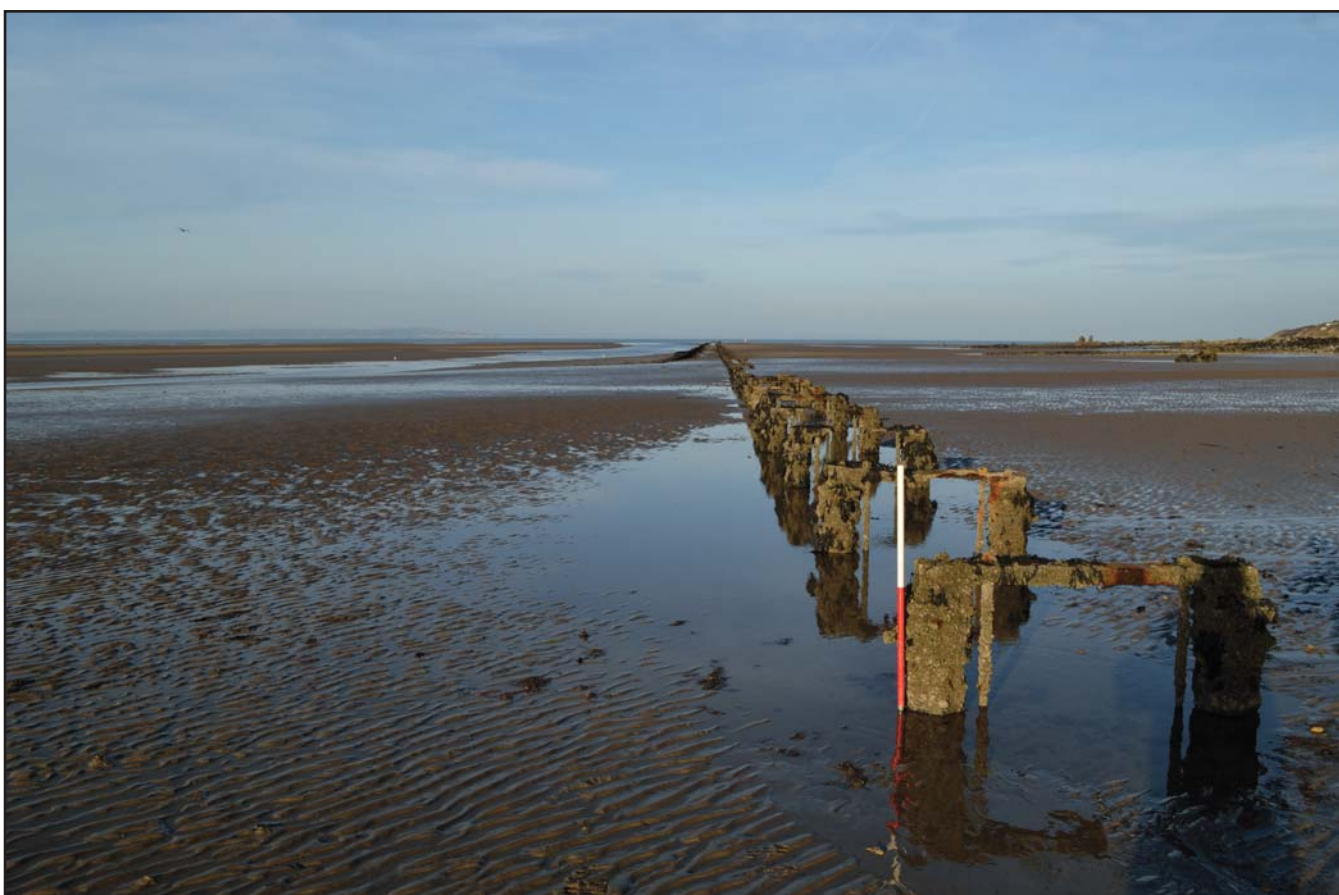


Plate 02: Metal stantions for 1876 pipe; scale: 1x1m (archive reference: G2600\_004).

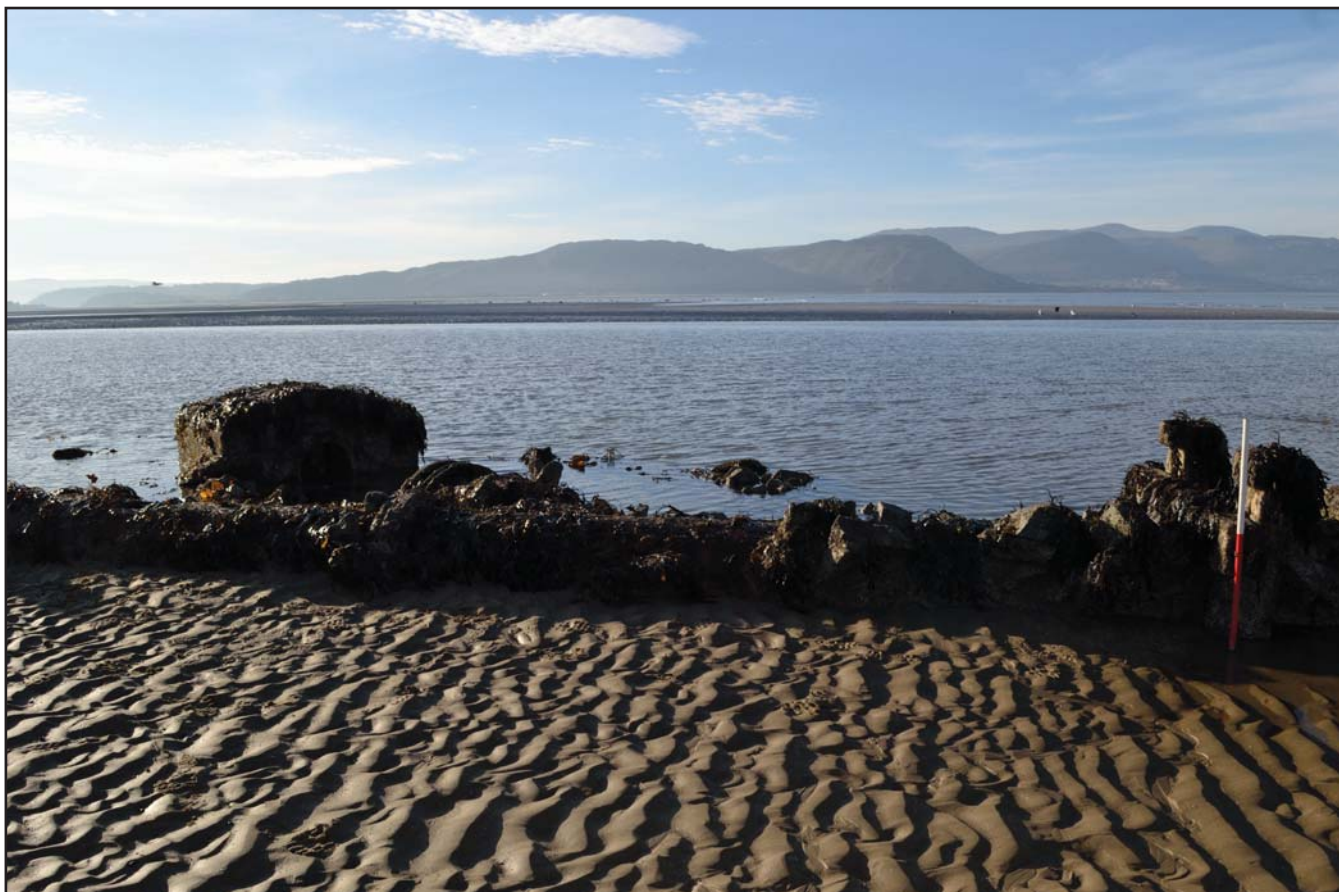


Plate 03: Remains of concrete connecting section of pipes; scale: 1x1m (archive reference: G2600\_008).

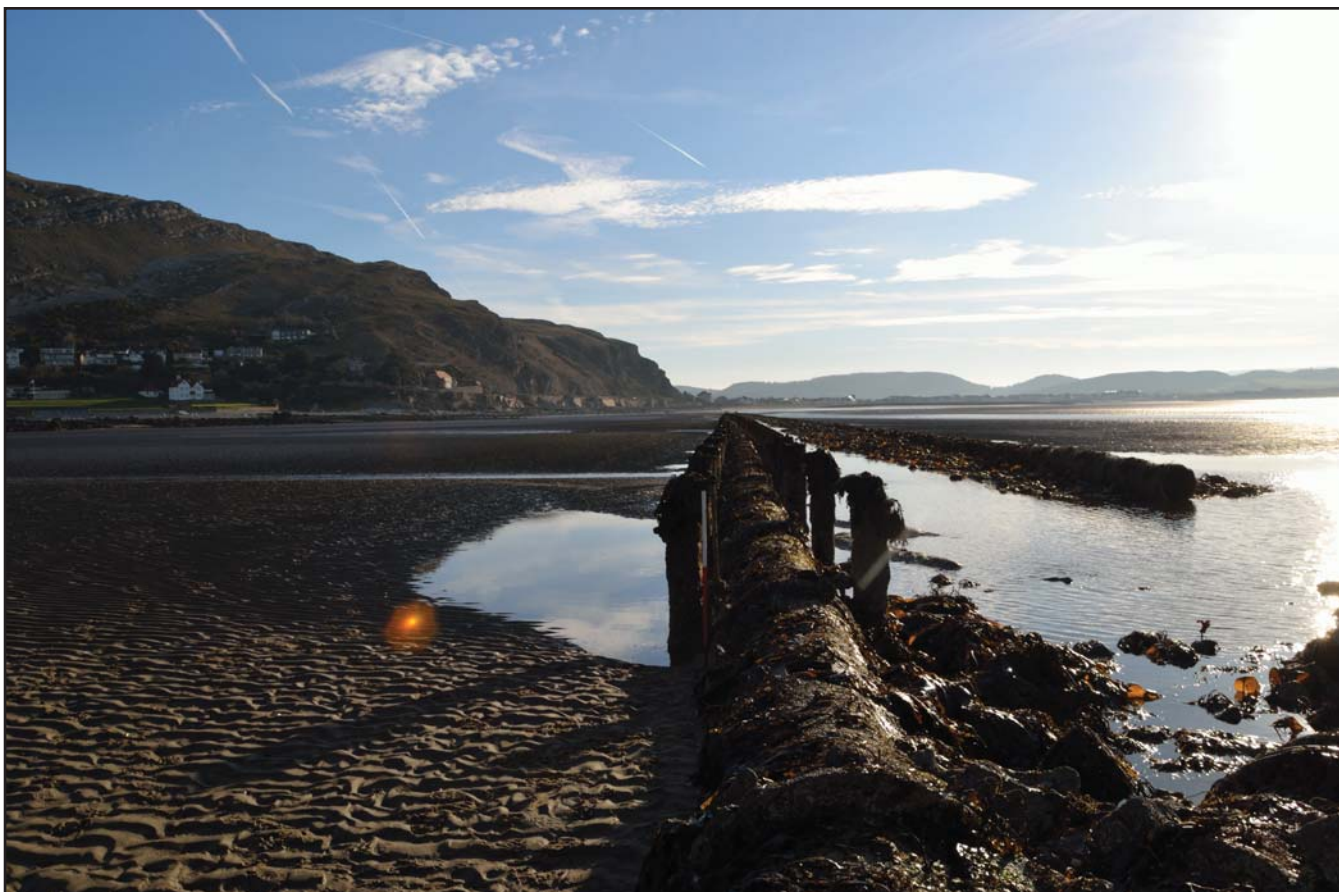


Plate 04: 45 degree connecting section and pipes; no scale (archive reference: G2600\_009).



Plate 05: Original wooden superstructure, 1876 pipe; scale: 1x1m (archive reference: G2600\_010).



Plate 06: Material collecting around the 1845 pipe view to sea; scale: 1x1m (archive reference: G2600\_014).



Plate 07: Material collecting around 1845 pipe, view to shore; scale: 1x1m (archive reference: G2600\_015).



Plate 08: Location of 2013 repair to 1876 pipe; scale: 1x1m (archive reference: G2600\_016).



Plate 09: 'Boulder field' leading SW from 1845 pipe; no scale (archive reference: G2600\_017).

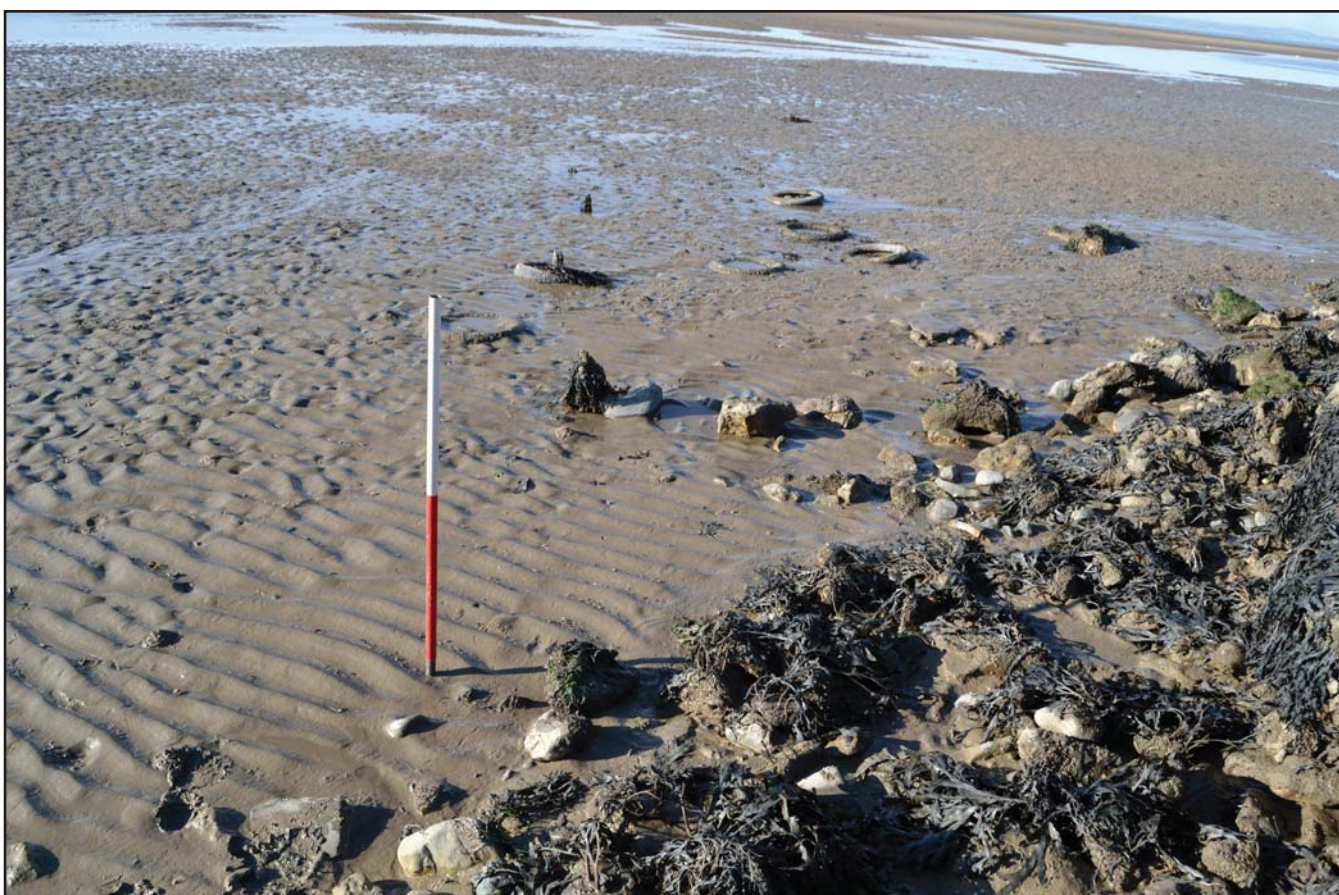


Plate 10: Wooden stakes of possible fish trap (PRN 77164); scale: 1x1m (archive reference: G2600\_019).



Plate 11: Possible fish trap (PRN 77164) and concrete repair; scale: 1x1m (archive reference: G2600\_020).



Plate 12: Quarry jetty (PRN 77163); scale: 1x1m (archive reference: G2600\_022).

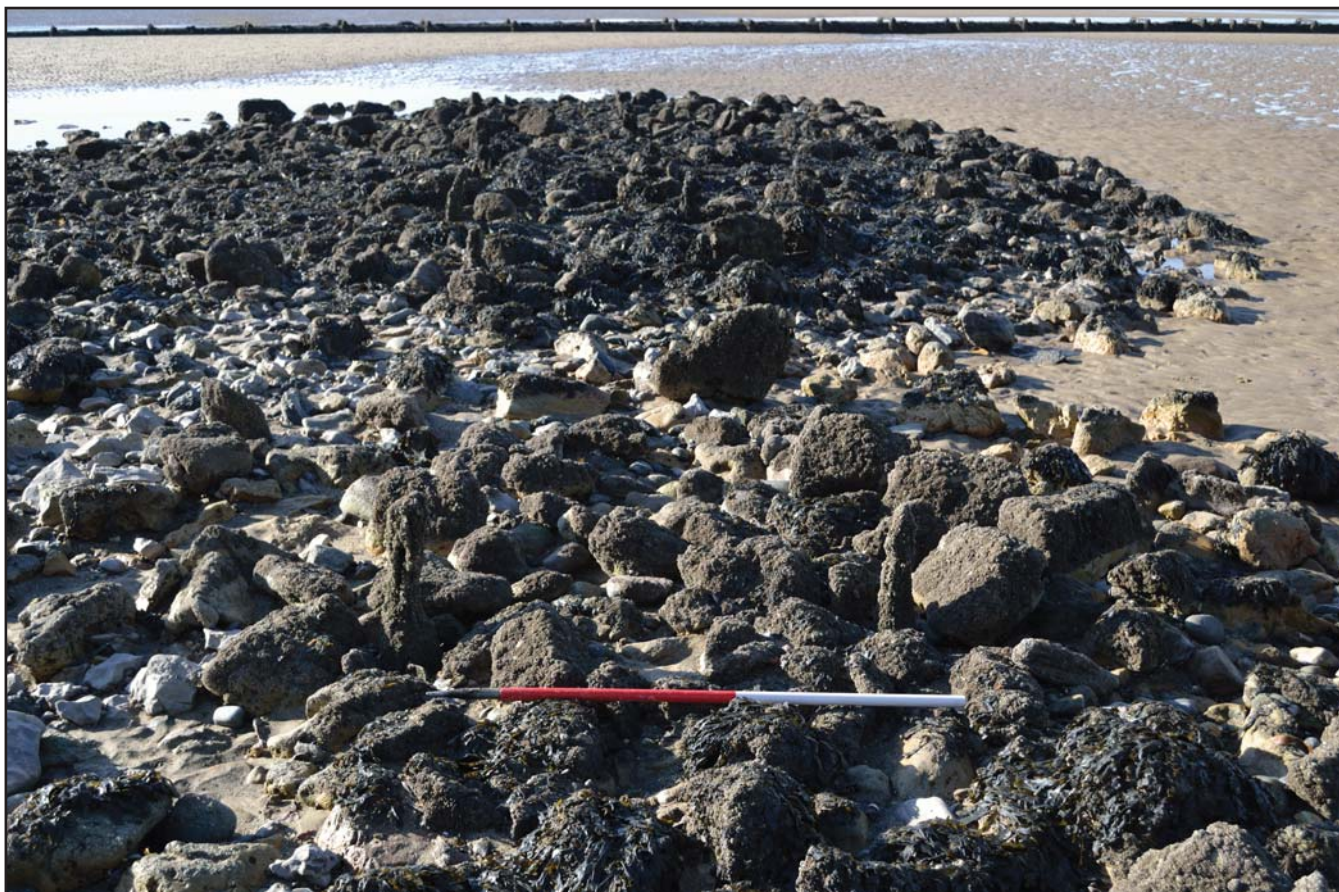


Plate 13: Wooden stakes of quarry jetty (PRN 77163; scale: 1x1m (archive reference: G2600\_024).



Plate 14: View of quarry jetty (PRN 77163) and pipes from Marine Drive; no scale (archive reference: G2600\_027).

## **APPENDIX I**

**Reproduction of Gwynedd Archaeological Trust written scheme of investigation**



GANOL OUTFALL (G2600)

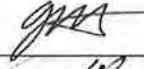
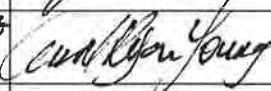

WRITTEN SCHEME OF INVESTIGATION FOR  
ARCHAEOLOGICAL ASSESSMENT

*Prepared for Arup*

***February 2019***



Ymddiriedolaeth Archaeolegol Gwynedd  
Gwynedd Archaeological Trust

Approvals Table				
	Role	Printed Name	Signature	Date
Originated by	Document Author	JOHN ROBERTS		14/02/19
Reviewed by	Document Reviewer	CAROL RAINYOUNG		14/2/19
Approved by	Principal Archaeologist	JOHN ROBERTS		14/02/19

Revision History			
Rev No.	Summary of Changes	Ref Section	Purpose of Issue

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

# GANOL OUTFALL (G2600)

## WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT

Prepared for *Arup*, February 2019

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# 1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Arup to prepare a written scheme of investigation for an archaeological assessment as part of a Marine Licence Application for marine works associated with the Ganol - West Shore Sewage Pumping Station in Llandudno, Conwy County Borough (NGR SH76688225; Post Code: LL30 2QZ; Figure 01). As specified in the current application documents, the proposed scheme is to upgrade an existing sewer outfall pipe on West Shore Beach, Llandudno. The existing 700mm diameter 1.1km long outfall pipe discharges the intermittent storm flows from West Shore and is in poor repair. The proposed works include repairing 6 known holes in the outfall, CCTV and jetting of 1.3km of the outfall, and potential repair of the pipe in the first 330m if found to be incomplete. The scheme area is located on DCWW Drawing No. 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000, reproduced as Figure 01.

The aim of the archaeological assessment will be to assess the impact of the proposals on proximity heritage assets as well as the potential for undiscovered features, with recommendations for appropriate mitigation, where applicable. The assessment will be focused on the local intertidal area, incorporating the route of the outfall and immediate environs.

The assessment will conform to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014). The format of this written scheme of investigation corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*).

GAT 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 Monitoring Arrangements

The archaeological mitigation 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 contact details are:

- Jenny Emmett [jenny.emmett@heneb.co.uk](mailto:jenny.emmett@heneb.co.uk) | 01248 370926; and
- Ashley Batten [ashley.batten@heneb.co.uk](mailto:ashley.batten@heneb.co.uk) | 01248 370926

## 1.2 Historic Environment Record

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER will be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER will be informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project.

The GAT HER Enquiry Number for this project is GATHER1068 and the Event PRN is 45398. The GAT HER will also be responsible for supplying Primary Reference Numbers (PRN) for any new assets identified and recorded.

## 2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

There are known archaeological assets within the immediate area.

A prehistoric stone axe findspot is located 60m south of the outfall route (Primary Reference Number (PRN) 4589; NGR SH76708220; Figure 02); the axe was identified lying on the shingle in low tide.

The Ganol Outfall cuts through two medieval fish traps: PRN 14611 (NGR SH75958240) and PRN 14612 (NGR SH76308230) (cf. Figure 02). Fish trap PRN 14611 comprises a 5m wide bank of stones running at a 45 degree angle to the shore with an arm running back towards the shore for about 20m; only the outer 100m of the trap is visible, whilst the inner end of the trap is still buried by sand retained by the sewage pipes. Preserved wooden stakes that formed part of the trap produced radiocarbon dates of 1460AD (Hopewell, 2000). Fish trap PRN 14612 is visible as a 0.2m high and 4m wide bank of pebbles and some larger stones that extends into the intertidal zone for c. 80m at roughly 90 degrees to the shore; the fish trap is assumed to continue to the shore beneath a sand embankment created by the outfall pipe (ibid.) These fish traps were assessed as part of a larger thematic study of fish traps and weirs by GAT in 2000 (ibid); information from this study will be used as part of the assessment. The assessment will need to consider the potential impact of the scheme works on these and any other features identified.

An examination of the First to Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheet of the area (Sheets XI.5, XI.6 and XL.4; 1888 to 1890, 1900 and 1913 respectively; cf. Figure 03 for a reproduction the Third Edition) shows little variance between the three editions, with the outfall pipe, referred to as sewage pipe, visible on all three.



## **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). For the purposes of this assessment, the study area will focus on the local intertidal area associated with outfall pipe and immediate environs.

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. 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 any sites 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);Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Gwasanaeth Archifau Conwy Archive Service, Old Board School, Lloyd St, Llandudno LL30 2YG). The examination of the archive data will include historic mapping including the local tithe map and schedule and will include information from the Mostyn Estate records.

5. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at <http://lle.gov.wales/catalogue/item/lidarcompositedataset/?lang=en> for information on potential surface features using digital terrain modelling and digital surface modelling;

## **3.2 Assessment (Walkover Survey)**

A walkover survey during low tide will form an integral part of the assessment and will incorporate the local intertidal area associated with outfall pipe and immediate environs, as indicated on Figure 01. All known and new archaeological features on the ground will be located and described on GAT pro-formas; the sites will then be added to a report 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 G2600\_001. A handheld GPS unit will also be used during the walkover survey

### 3.3 Assessment (Gazetteer)

A gazetteer will be compiled for any existing and newly identified sites within the assessment area, based on information sourced from the desk based assessment and walkover; the gazetteer will be prepared in the following format and will include:

<b>Feature Number</b>	
<b>Site name</b>	
<b>PRN number</b>	
<b>Grid reference</b>	
<b>Period</b>	
<b>Site type</b>	
<b>Assessment category</b>	
<b>Description</b>	
<b>Impact</b>	
<b>Recommendation for further assessment/evaluation</b>	
<b>Recommendation for mitigatory measures</b>	

**The following categories will be used to define the assessment category of the archaeological asset:**

*Category A - Sites of National Importance.*

Scheduled Monuments, Listed Buildings of grade II\* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both. Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

*Category B - Sites of regional or county importance.*

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

*Category C - Sites of district or local importance.*

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened. Category C sites nevertheless merit adequate recording in advance of damage or destruction.

*Category D - Minor and damaged sites.*

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

*Category E - Sites needing further investigation.*

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation. In this report several sites of unknown potential have been allocated to this category.

**The impact of the proposed works on any asset will be identified using the following impact criteria, defined either as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:**

*None:*

There is no construction impact on this asset.

*Slight:*

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

*Unlikely:*

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

*Likely:*

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

*Significant:*

The partial removal of an asset affecting its overall integrity. Assets falling into this category may be linear features such as roads or tramways where the removal of part of the feature could make overall interpretation problematic.

*Considerable:*

The total removal of an asset or its partial removal which would effectively destroy the remainder of the site.

*Unknown:*

This is used when the location of the asset is unknown, but thought to be in the vicinity of the proposed works.

### 3.4 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 (Bilingual);
  5. Introduction;
  6. Methodology;
    - i. Desk-based assessment;
    - ii. Walkover 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;
  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);
- 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 full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological assessment outlined in this written scheme of investigation will be submitted in draft format in February 2019; a final report will be submitted to the Historic Environment within six months of submitting the draft report (July 2019).

The following dissemination will apply:

- A paper report(s) plus digital report(s) will be provided to the client/consultant 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), along with any relevant, digital information such as the project database, GIS table(s) and photographs. All digital datasets submitted will conform to the required standards set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1);
- 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), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata;



## **4 PERSONNEL**

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The assessment will be completed by a project archaeologist who will have responsibility for completing the desk based assessment, maintaining the site archive, liaising with GAPS and *Arup* and submitting the draft report and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

## **5 INSURANCE**

### **5.1 Public/Products 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/UN/000375

EXPIRY DATE 21/06/2019

### **5.2 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 24765101 CHC / UN/000375

EXPIRY DATE 21/06/2019

### **5.3 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 9446015

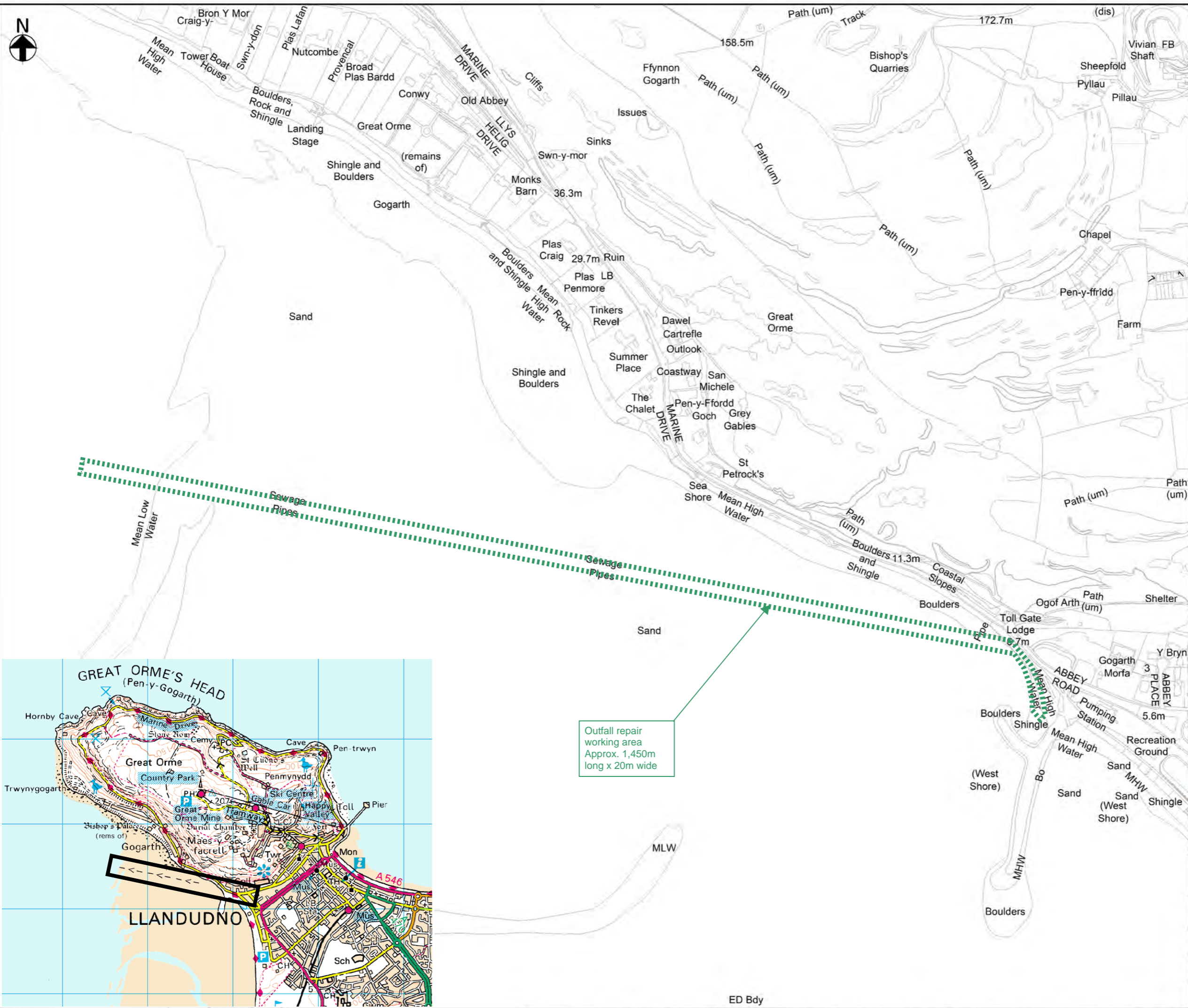
EXPIRY DATE 22/07/2019

## 6 SOURCES CONSULTED

1. English Heritage, 1991, Management of Archaeological Projects
2. English Heritage, 2015, Management of Research Projects in the Historic Environment (MoRPHE).
3. *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1)
4. Hopewell, D., 2000. An Assessment of Coastal Fish Weirs and Traps. *Gwynedd Archaeological Trust Report No. 363*
5. Ordnance Survey First Edition 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4; published in 1888 to 1890.
6. Ordnance Survey Second Edition 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4; published in 1900.
7. Ordnance Survey Third Edition 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4; published in 1913.
8. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*
9. Standard and Guidance for Archaeological Geophysical Survey (Chartered Institute for Archaeologists, 2014).
10. Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014).

**FIGURE 01**

**Reproduction of DCWW Drawing No. 4591\_S\_202-ARP-XX-ZZ-DR-CX-06000**



**KEY**

CONSTRUCTION WORKING AREA

**NOTES**

- Grid reference SH769821
- For details of all works to outfall onto the beach refer to drawing DCWW.4599.S.201-ARP-07-01-DR-CD-05101

This map is based upon the Ordnance Survey material with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright 2010. Licence Number: WU298565

0 25 50 100 150 200 Metres

Outfall repair working area  
Approx. 1,450m long x 20m wide

P1	22-10-18	AM	FOR INFORMATION	HM	DA	23-10-18
Rev.	Date	Drawn	Description	Chkd.	Appd.	Date

**Capital Delivery Alliance**  
**Cynghair Cyflawni Cyfalaf**

Ty Awen, Spooner Close, Coed Kernew, Newport, NP108FZ

Project Name: **GANOL WEST SHORE SPS**

Drawing Title: **WEST SHORE SPS  
OUTFALL REPAIR  
OS PLAN**

Suitability: **FOR INFORMATION** Suitability Code: **S2**

Originator	HM	Designer	AM	Date	22-10-18
Internal Project Number	241529	Scale	1:5,000	Rev.	P1

Drawing Number: **4591\_S\_202-ARP-XX-ZZ-DR-CX-06000**

## **FIGURE 02**

**Location of assessment/ area (outlined green) and local archaeological features; based on Ordnance Survey 1:10000 County Series Map Sheets SH78SE. Scale 1:5000 @ A4 © Crown Copyright. All Rights Reserved. Licence Number AI100020895.**



## **FIGURE 03**

**Third Edition Ordnance Survey 1-inch to 25-mile County Series Map Sheets XI.5, XI.6 and XL.4, published in 1913, with location of assessment/evaluation area outlined red. Scale: 1 to 5000 @A4.**





## **APPENDIX II**

**Gwynedd Archaeological Trust photographic metadata**

PHOTO RECORD NUMBER*	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION	ORIGINATING ORGANISATION	PLATE
G2600_001	General view along pipeline from the shore	ESE		Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	
G2600_002	General view of pipeline with coastal defences, revetments and great Orme	SE		Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	01
G2600_003	Pipeline from the shore	ESE		Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	Cover
G2600_004	View of pipe stantions from the eastern end	ESE	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	02
G2600_005	View of pipe stantions with the Orme in the background	S	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	
G2600_006	View of iron (1843) pipe from its appearance above the sand	ESE	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	
G2600_007	View along outfall pipe at the tidal limit	ESE	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	
G2600_008	View of redundant pipe connection at N53.32451 W-3.86652	NNE	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	03
G2600_009	View along oufall pipes from the tidal limit out to sea	WNW	1X1m	Carol Ryan Young	25/02/2019	Gwynedd Archaeological Trust	04
G2600_010	Detail of 1876 pipe showing wooden superstructure still surviving.	WNW	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	05

PHOTO RECORD NUMBER*	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION	ORIGINATING ORGANISATION	PLATE
G2600_011	Site of repair (2013)	E	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_012	Site of repair (2013) - different angle	NNE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_013	Large concrete concretion (primitive repair?)	NNE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_014	View down short pipe to sea	WNW	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	06
G2600_015	View down short pipe to land	ESE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	07
G2600_016	Pipe repair - Large section replaced about halfway down outfall	SE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	08
G2600_017	Possible site of fish trap - taken from seaward pipe	NE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	09
G2600_018	Walkway between pipes (halfway down outfall)	ESE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_019	Wooden stakes (possible fishtrap) from pipe N53.32332 W-3.85563	NE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	10
G2600_020	Wooden stakes (possible fishtrap) view toward seaward/short pipe.	SW	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	11
G2600_021	View from pipes to fish trap landward side	SSW		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_022	View down fish trap timbers - mid distance	SSW	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	12

PHOTO RECORD NUMBER*	DESCRIPTION*	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION	ORIGINATING ORGANISATION	PLATE
G2600_023	View down fish trap from shingle to pipes	NNE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_024	Detail - stakes in fish trap N53.32389 W-3.85571	NNE	1X1m	Robert Evans	25/02/2019	Gwynedd Archaeological Trust	13
G2600_025	Wide angle fish trap from land side	SE		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_026	View down pipes from beach	ESE		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_027	View of fish traps from Orme Road	NE		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	14
G2600_028	View fish traps and pipes out to sea from Orme Road	E		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	
G2600_029	General view towards Llandudno from the former look out post - Orme Road	NNW		Robert Evans	25/02/2019	Gwynedd Archaeological Trust	

## **APPENDIX III**

### **Categories of importance**

**The following categories will be used to define the assessment category of the archaeological asset:**

*Category A - Sites of National Importance.*

Scheduled Monuments, Listed Buildings of grade II\* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both. Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

*Category B - Sites of regional or county importance.*

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

*Category C - Sites of district or local importance.*

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened. Category C sites nevertheless merit adequate recording in advance of damage or destruction.

*Category D - Minor and damaged sites.*

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

*Category E - Sites needing further investigation.*

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation. In this report several sites of unknown potential have been allocated to this category.



Gwynedd Archaeological Trust  
Ymddiriedolaeth Archaeolegol Gwynedd

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