MORFA FRIOG EMBANKMENT, FAIRBOURNE

Archaeological Watching Brief

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

MORFA FRIOG EMBANKMENT, FAIRBOURNE

Archaeological Watching Brief

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Prepared for: Natural Rescources Wales

November2015

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Approvals Table				
	Role	**Printed Name**	**Signature**	**Date**
Originated by	Document Author	Robert Evans		26/11/2015
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Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**

Contents

SUMMARY

Gwynedd Archaeological Trust was asked by Natural Resources Wales to carry out an archaeological watching brief during groundworks associated with a saltmarsh habitat creation project at Morfa Friog, Fairbourne, Gwynedd. The saltmarsh habitat was designed to mitigate for the loss of natural habitats that will be lost in the future as a result of the wider flood defence scheme.

The flood bank at Morfa Friog, protects the low lying Mawddach estuary north of Fairbourne from marine inundation. It follows a north-west to south sinuous course along the salt marsh. The main bank, probably built soon after 1868, is constructed of an orangy brown clay and appears to be built in a single phase. It is built on blue grey estuarine clay silt, which is clearly a natural deposit. It has a trapezoidal profile and is about 2.65m high and 11.1m wide, and on the north side it appears to have been reinforced with closely packed cobblestones, which would appear to have been a secondary event. These were probably placed to strengthen the bank after a period of erosion, on the side most in need of protection from the prevailing weather conditions.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was asked by Natural Resources Wales to carry out an archaeological watching brief during groundworks associated with a saltmarsh habitat creation project at Morfa Friog, Fairbourne, Gwynedd (centred on NGR SH61341438; Figure 1). The work was carried out in line with a planning requirement for the wider flood defence scheme at Fairbourne, reference number C13/0569/01/LL. The saltmarsh habitat was designed to mitigate for the loss of natural habitats that will be lost in the future as a result of the wider flood defence scheme.

The watching brief involved monitoring the breaching of the existing flood alleviation embankment, as indicated on *Black & Veatch* drawing 109448-02 and 109448-03 (Figures 1 and 2 respectively). The embankment measured 560.0m in length and was located along the edge of marshland, connecting to a shingle bank and protecting the Fairbourne railway line to the west. The embankment breach was located at NGR SH61341438 and measured 11.10m in length and 6.20m in width (Figures 3 and 4).

The embankment breach groundworks took place from the 9th to the11th November 2015, and they were completed by *Alun Griffiths.*

The work was carried out according to a specification agreed by Gwynedd Archaeological Planning Services on 06th November 2015 (GAPS; see Appendix I), and the scheme was monitored by them.

The watching brief conformed to the guidelines specified in *Standard and Guidance for an archaeological watching brief* (Chartered Institute for Archaeologists, 2014). Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*. The format of this design corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*).

2 ARCHAEOLOGICAL AND GEOLOGICAL BACKGROUND

2.1 Geological Background

A large gravel and sand spit extends across the Mawddach estuary northwards from Fairbourne. Much of the spit consists of gravel, but recurves at the northern end are predominantly sandy dunes. The main source of coarser sediment is probably the large grave fans at Llwygwril to the south. The Mawddach estuary is predominantly sandy and like the Dyfi estuary, has acted as a long-term sink for sandy sediment. Steers (1964) in a photograph shows areas of both vegetated and unvegitated mobile dunes (Pye *et al.* 2007, 69).

2.2 Archaeological Background

An examination of historic mapping suggests the embankment was constructed between the publication of the Llangelynin Parish Tithe Map in 1839 and the First Edition 1" to 25 mile Ordnance Survey Map in 1889 (Merioneth County Series Map Sheet XXXVI). There is some evidence to suggest that the Morfa Friog embankment was constructed after 1868, as a specification for work in that area is dated March 1868 (Frost 2009). The embankment appears not to have been altered since construction as there is no variation in form between the 1889 map and the current map.

Gwynedd Archaeological Trust completed a programme of archaeological mitigation in 2013 during flood defence works to the south of the current works (Evans, R. GAT Report *forthcoming*) and included repair works to a 170.0m length of embankment located 180.0m south of the current works. The embankment monitored in 2013 was constructed before the embankment to the north and is extant on the 1839 Llangelynin Parish Tithe Map. The watching brief confirmed the embankment was constructed from compacted clay reinforced with shale rubble material, which included some quite large blocks (up to 0.7m by 0.5m). Some slippage of this material was noted to the east of the bank, and this was repaired as part of the remedial works.

The nature of the make-up and construction of the Morfa Friog bank formed the focus of the current watching brief.

3 METHODOLOGY

3.1 Introduction

The definition of an archaeological watching brief is “a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive” (*Standard and Guidance for an archaeological watching brief* (CIfA, 2014, p1)).

The purpose of the watching brief is:

- to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works

- to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.

This definition and Standard do not cover chance observations, which should lead to an appropriate archaeological project being designed and implemented, nor do they apply to monitoring for preservation of remains in situ.

An archaeological watching brief is divided in to four categories according the Institute for Archaeologists *Standard and Guidance for an archaeological watching brief*:

- comprehensive (present during all ground disturbance)

- intensive (present during sensitive ground disturbance)

- intermittent (viewing the trenches after machining)

- partial (as and when seems appropriate).

A **partial** watching brief was agreed with GAPS for this scheme, to be completed during groundworks for breaching the embankment at the location on Figure 1. The work was carried out on the 9th November 2015.

The **watching brief** consisted of the following:

- Observation of non-archaeological excavation works associated with the breaching of the Morfa Friog, Fairbourne flood alleviation embankment at NGR SH61341438.

- A written and photographic record of the breached embankment and exposed profiles/sections.

- A drawn section of the bank profile/section at a scale of 1:40.

- Preparation of full archive report.

3.2 Watching Brief

- Photographic images were taken using a digital SLR camera set to RAW format and were converted to TIFF and JPEG format for archiving. Images were taken of the embankment prior to breaching and record shots were taken during the breaching works. Images will also be taken of the breached embankment profile/sections;
- A day record sheet and photographic record sheet were completed using GAT pro-formas. A complete table of metadata with details of each photographic image taken, including descriptions and directions of shot, were produced using Microsoft Access (archive images G2440_Morfa Friog_001 to G2440_Morfa Friog_014; see Appendix II for a reproduction of the metadata).
- A section and plan were completed of the embankment breach (cf. Figures 3 and 4 respectively).

4 RESULTS OF THE WATCHING BRIEF

For the purposes of this section, context numbers within square brackets, e.g. [005], represent cut features, such as pits, ditches etc., and context numbers within round brackets, e.g. (001), represent deposits and fills.

A breach was made in the Morfa Friog embankment, located at NGR SH61341438. It measured 11.3m in length and 6.2m in width (Figure 02), and was approximately 350m south west of the roadside end of the embankment adjacent to Penrhyn Road (Figure 01; Plates 01-02).

The bank itself has a trapezoidal profile and is about 2.65m high and 11.1m wide. The bank was found to be essentially of a mid greyish brown clay (101). It seems to be a single phased construction, with frequent medium and large stone inclusions (Figure 03; Plates 3-5). It overlies a mid blueish grey silty estuarine clay, on which the bank appears to have been placed (102). This suggests silting up of the estuary was taking place before the bank was built.

Cobblestones, up to 0.4m by 0.3m, were placed on the northern face of the bank (103), against the prevailing weather conditions and potential flood inundation (Figures 03-04). This appears to have been a secondary event, as the bank surface appears to have been scraped, as represented by [106] and the bank face remodelled with the cobblestones above rough stone packing about 0.4m thick with rubble and a mid orangey brown silty clay infill (107). The cobblestones were tightly packed on the embankment face providing a robust surface (Plates 1, 4). It can be suggested that the placing of the cobblestones was a repair measure to prevent erosion from it.

No other archaeological features were noted during the watching brief.

5 CONCLUSIONS

The flood bank at Morfa Friog, protects the low lying Mawddach estuary north of Fairbourne from marine inundation. It follows a north-west to south sinuous course along the salt marsh. The main bank is constructed of an orangey brown clay and appears to be built in a single phase. It is built on a blue grey estuarine clay silt, which is clearly a natural deposit. It has a trapezoidal profile and is about 2.65m high and 11.1m wide, and on the north side it appears to have been reinforced with closely packed cobblestones, which would appear to have been a secondary event. These were probably placed to strengthen the bank after a period of erosion, on the side most in need of protection from the prevailing weather conditions.

6 SOURCES CONSULTED

British Geological Survey *Online Geology of Britain Viewer*

Black & Veatch drawing 109448-02 and 109448-03

Chartered Institute for Archaeologists 2014 *Standards and Guidance for an archaeological watching brief*

English Heritage, 1991, Management of Archaeological Projects

English Heritage 2015. *Management of Research Projects in the Historic Environment (MoRPHE)*.

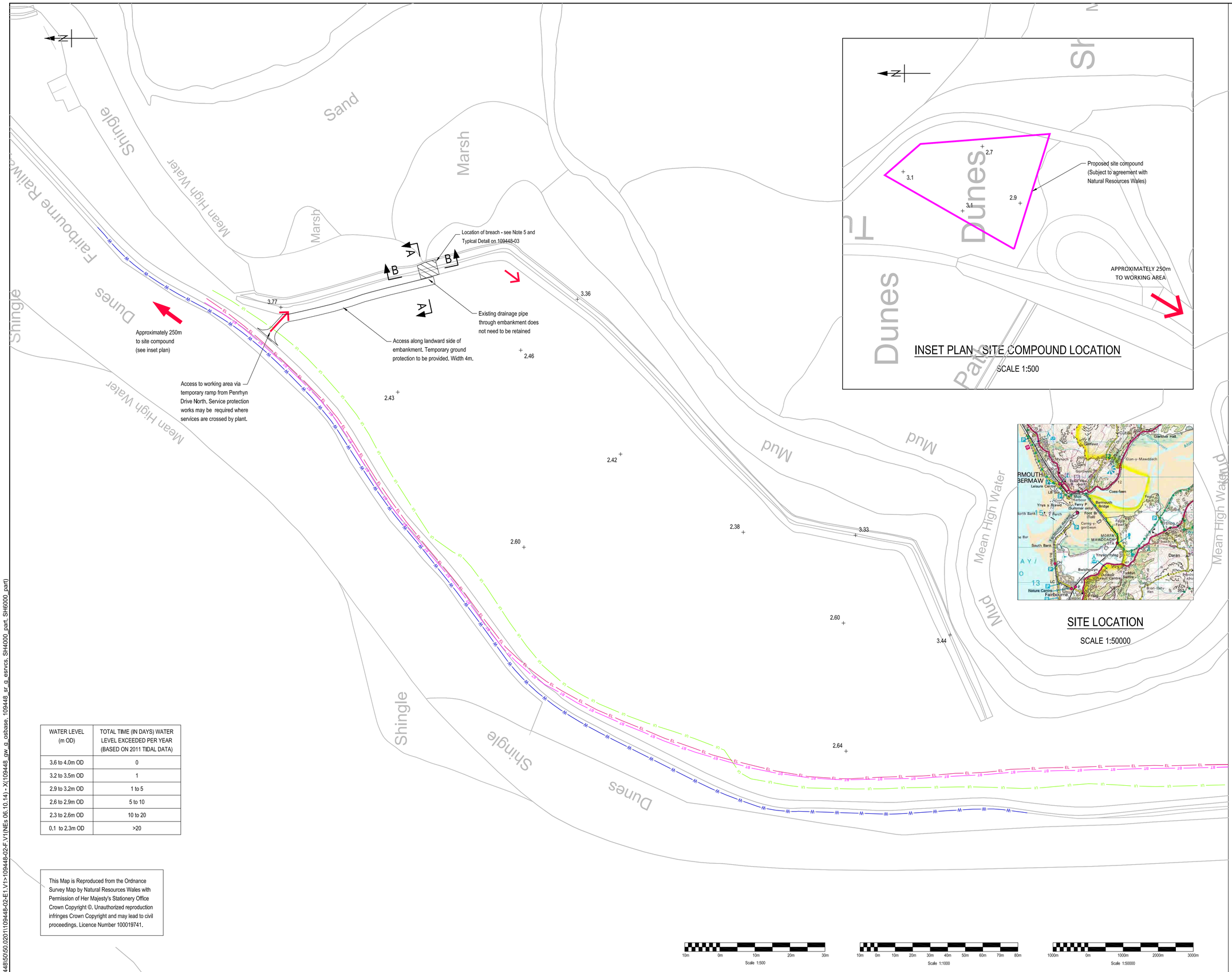
Evans, R. 2014 *Fairbourne Flood Defences Renewal, Fairbourne, Gwynedd: Archaeological Building Recording and Watching Brief*. GAT Report 1209

Frost, P. 2009 *Fairbourne Viability Study, Fairbourne.Archaeological Desk-Based Assessment*. Castlering Archaeology Report No. **316**

Pye, K., Saye, S. and Blott,S. 2007 *Sand Dune Processes and Management for Flood and Coastal Defence Part 3: The Geomorphological and Management Status of Coastal Dunes in England and Wales.* Environment Agency/DEFRA Technical Report **FD1302/TR**

Regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor LL57 2RT)

Steers, J.A. 1964 *The Coastline of England and Wales* (Cambridge)



INSET PLAN SITE COMPOUND LOCATION

SCALE 1:500

SITE LOCATION

SCALE 1:50000

WATER LEVEL (m OD)	TOTAL TIME (IN DAYS) WATER LEVEL EXCEEDED PER YEAR (BASED ON 2011 TIDAL DATA)
3.6 to 4.0m OD	0
3.2 to 3.5m OD	1
2.9 to 3.2m OD	1 to 5
2.6 to 2.9m OD	5 to 10
2.3 to 2.6m OD	10 to 20
0.1 to 2.3m OD	>20

10m 0m 10m 20m 30m
Scale 1:500

10m 0m 10m 20m 30m 40m 50m 60m 70m 80m
Scale 1:1000

1000m 0m 1000m 2000m 3000m
Scale 1:50000

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

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Notes

1. Site access route and compound location to be agreed with Natural Resources Wales. The tidal nature of the site should be considered.
2. Topographic survey of the site is provided in the Works Information.
3. Services on this drawing obtained from plans provided by Service Providers (dated May 2014) and service tracing survey (July 2013).
4. The suitability of the existing bank for tracking plant along (including its stability) has not been assessed.
5. The breach should be centred on the existing drainage pipe.

Legend

- EL — Electricity (Hv) underground (from Survey)
- BT — BT underground (from Survey)
- UI — Unidentified Service (from Survey)
- W — Water Main (from service plans)
- Proposed Site Compound

Safety Health and Environmental information
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:
Construction. 1. No specific risks identified.
Maintenance/Cleaning/Operation. 1. No specific risks identified' as other headings
Decommissioning/Demolition. 1. No specific risks identified.

Rev	Drawn	Chkd	Rvwd	Apprvd	Date	Description
F	NEs	MDR	TPMP	TPMP	06.OCT.14	CONSTRUCTION ISSUE
E	SPJ	MDR	EAS	EAS	30.JUL.14	CONSTRUCTION ISSUE
D	PRY	MDR	EAST	TPMP	17.JUN.14	CONSTRUCTION ISSUE
C	SPJ	MBo	EAS	EAS	21.JUN.13	LOCATION OF DUNE SCRAPE AMENDED
B	SPJ	MDR	EAST	EAST	30.MAY.13	PLANNING APPLICATION
A	SPJ	MDR	EAST	TPMP	22.APR.13	RAG LIST SIGN OFF

Designed by: MDR Date: 19.MAR.13

Client

Cyfoeth Naturiol Cymru Natural Resources Wales

Client Drawing No. | Revision

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Tel: +44(0)1737 774155

Project

MORFA FRIOG
SALTMARSH HABITAT CREATION

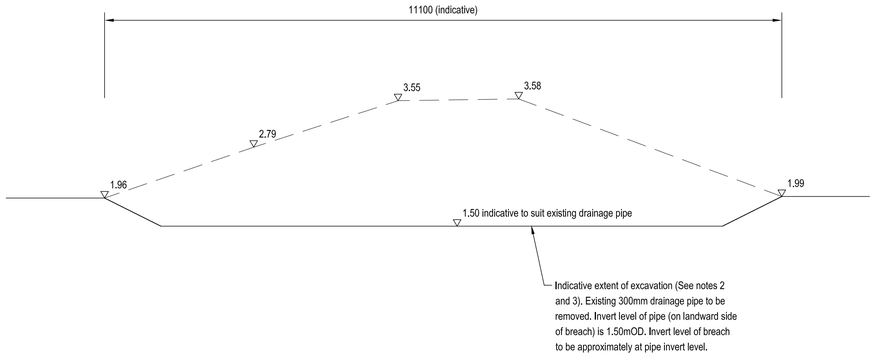
Drawing title

GENERAL ARRANGEMENT AND SERVICE PLAN

Drawing scale: AS SHOWN Sheet size: A1

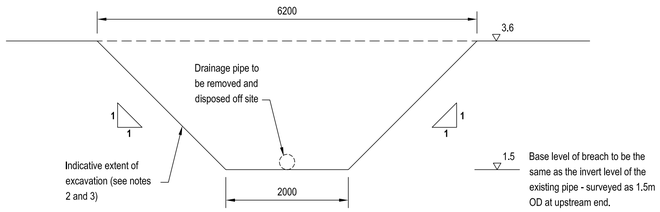
Drawing no. 109448 – 02 | Revision F

109448\50\50.02\01\109448-02-F.V1>109448-02-F.V1(NEs 06.10.14) - X(109448_gw_g_osbase, 109448_sr_g_esrvcs, SH4000_part, SH6000_part)



SECTION AA

SCALE 1:50



SECTION BB - TYPICAL DETAIL OF "REDUCED" BREACH

SCALE 1:50

WATER LEVEL (m OD)	TOTAL TIME (IN DAYS) WATER LEVEL EXCEEDED PER YEAR (BASED ON 2011 TIDAL DATA)
3.6 to 4.0m OD	0
3.2 to 3.5m OD	1
2.9 to 3.2m OD	1 to 5
2.6 to 2.9m OD	5 to 10
2.3 to 2.6m OD	10 to 20
0.1 to 2.3m OD	>20

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

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Cronfa Datblygu Rhanbarthol Ewrop
Europe & Wales: Investing in your future
European Regional Development Fund

Notes

1. Topographic survey of the site is provided in the Works Information.
2. Excavated surface to be graded with machine bucket or similar. No formal topsoiling or reinstatement required. Base of breach should be excavated to allow free flow of water between existing small channel at downstream end of existing pipe (to be removed) and existing low area at its upstream end.
3. All excavated material to be removed from site and disposed of at an appropriate waste management facility. Natural Resources Wales consent required prior to recycling or re-use at alternative locations.

Safety Health and Environmental information
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:
Construction. 1. No specific risks identified.
Maintenance/Cleaning/Operation. 1. No specific risks identified.
Decommissioning/Demolition. 1. No specific risks identified.

1m 0m 1m 2m 3m
Scale 1:50

Rev	Drawn	Chkd	Rvwd	Apprvd	Date	Description
C	NEs	MDR	TPMP	TPMP	06.OCT.14	CONSTRUCTION ISSUE
B	PRY	MDR	EAST	TPMP	17.JUN.14	CONSTRUCTION ISSUE
A	SPJ	MDR	EAST	TPMP	22.APR.13	RAG LIST SIGN OFF

Designed by: MDR Date: 19.MAR.13

Client

Cyfoeth Naturiol Cymru
Natural Resources Wales

Client Drawing No. | Revision

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Project

MORFA FRIOG
SALTMARSH HABITAT CREATION

Drawing title

SECTIONS AND DETAILS

Drawing scale: 1:50 Sheet size: A1

Drawing no. 109448 – 03 | Revision C

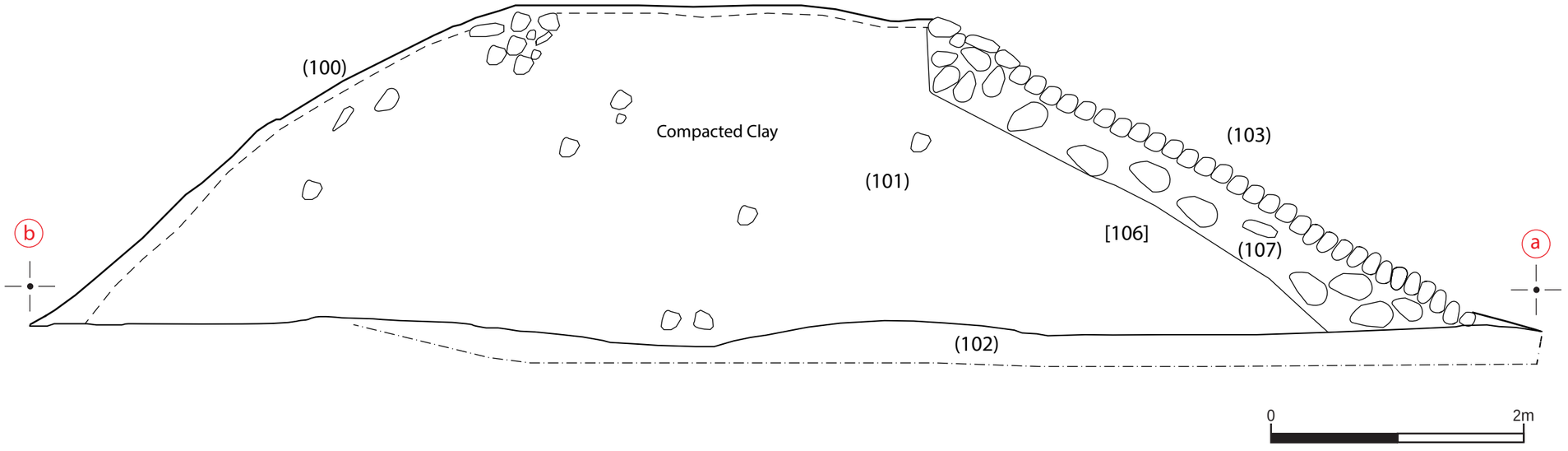


Figure 03: East Facing Section of Morfa Friog Embankment

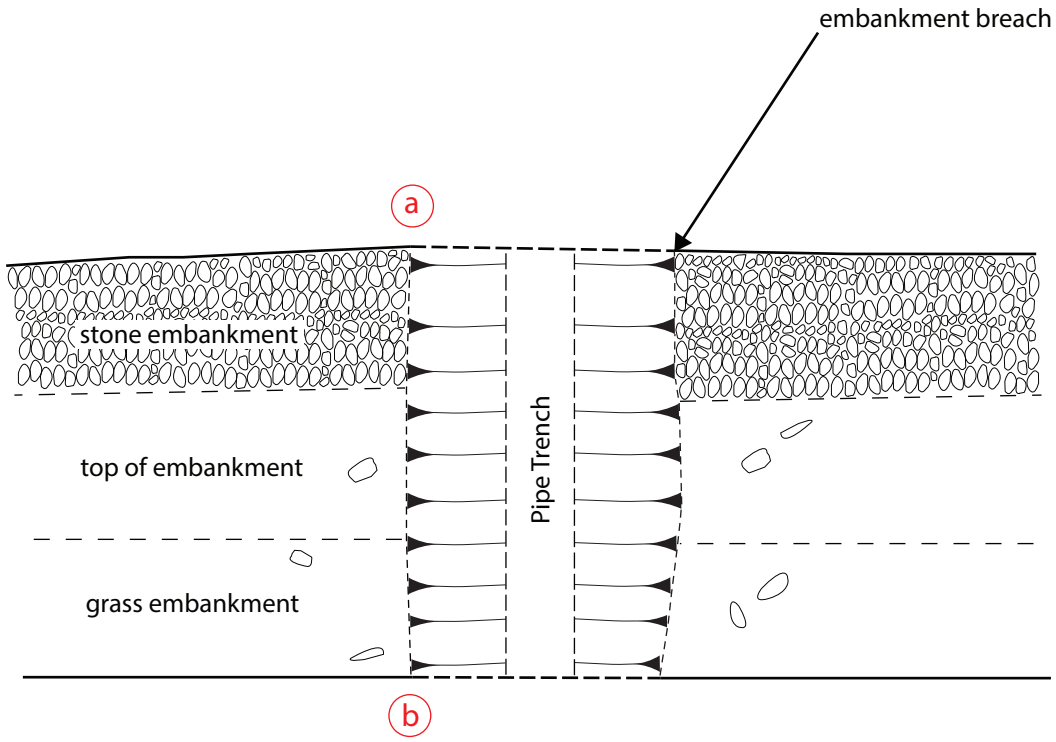


Figure 04: Plan of Morfa Friog Embankment Breach (Stones Representative Only)

Plate 01: View from West along the embankment from Penrhyn estuary. 1m scale.

Plate 02: General view of embankment. View from West.

Plate 03: View of East facing section from the embankment. 1m scale.

Plate 04: West facing section through the bank after machining.

Plate 05: View of cut through the embankment from the South. 1m scale.

Plate 06: General shot along embankment from the Northeast. 1m scale.

APPENDIX I

Reproduction of Gwynedd Archaeological Trust project design for archaeological watching brief (November 2015)

MORFA FRIOG, FAIRBOURNE

PROJECT DESIGN FOR AN ARCHAEOLOGICAL WATCHING BRIEF (G2440)

Prepared for

Natural Resources Wales

November 2015

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

MORFA FRIOG, FAIRBOURNE

PROJECT DESIGN FOR AN ARCHAEOLOGICAL WATCHING BRIEF (G2440)

Prepared for Natural Resources Wales, November 2015

Contents

Approvals Table				
	Role	**Printed Name**	**Signature**	**Date**
Originated by	Document Author	Robert Evans		05/11/2015
Reviewed by	Document Reviewer	Stuart Reilly		05/11/2015
Approved by	Principal Archaeologist	John Roberts		05/11/2015

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

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Natural Resources Wales to provide a project design for undertaking an archaeological watching brief during groundworks associated with a saltmarsh habitat creation project at Morfa Friog, Fairbourne, Gwynedd (centred on NGR SH61341438; Figure 1).

The watching brief will be limited to monitoring the breaching of the existing flood alleviation embankment, as indicated on *Black & Veatch* drawing 109448-02 and 109448-03 (Figures 1 and 2 respectively). The embankment measures 560.0m in length and is located along the edge of marshland, connecting to a shingle bank and protecting the Fairbourne railway line to the west. The proposed breach will be located at NGR SH61341438 and will measure 11.10m in length and 6.20m in width.

The embankment breach groundworks are scheduled to take place w/c 9th November 2015. It is anticipated that the embankment breaching itself will take place on 9th-10th November 2015, after site set-up procedures have taken place. The groundworks will be completed by *Alun Griffiths.*

A brief has not been prepared for this work by Gwynedd Archaeological Planning Services (GAPS), but the scheme will be monitored by GAPS and a copy of this design must be approved by GAPS prior to the start of the watching brief.

The watching brief will conform to the guidelines specified in *Standard and Guidance for an archaeological watching brief* (Chartered Institute for Archaeologists, 2014). Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*. The format of this design corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*).

2 ARCHAEOLOGICAL BACKGROUND

An examination of historic mapping suggests the embankment was constructed between the publication of the Llangelynin Parish Tithe Map in 1839 and the First Edition 1" to 25 mile Ordnance Survey Map in 1889 (Merioneth County Series Map Sheet XXXVI). The embankment appears not to have been altered since construction as there is no variation in form between the 1889 map and the current map.

Gwynedd Archaeological Trust completed a programme of archaeological mitigation in 2013 during flood defence works to the south of the current works (Evans, R. GAT Report *forthcoming*) and included repair works to a 170.0m length of embankment located 180.0m south of the current works. The embankment monitored in 2013 was constructed before the embankment to the north and is extant on the 1839 Llangelynin Parish Tithe Map. The watching brief confirmed the embankment was constructed from compacted clay reinforced with shale rubble material, which included some quite large blocks (up to 0.7m by 0.5m). Some slippage of this material was noted to the east of the bank, and this was repaired as part of the remedial works.

The nature of the make and construction of the Morfa Friog bank which forms the focus of the current watching brief is unknown.

3 METHODOLOGY

3.1 Introduction

The definition of an archaeological watching brief is “a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive” (*Standard and Guidance for an archaeological watching brief* (CIfA, 2014, p1)).

The purpose of the watching brief is:

- to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works

- to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.

This definition and Standard do not cover chance observations, which should lead to an appropriate archaeological project being designed and implemented, nor do they apply to monitoring for preservation of remains in situ.

An archaeological watching brief is divided in to four categories according the Institute for Archaeologists *Standard and Guidance for an archaeological watching brief*:

- comprehensive (present during all ground disturbance)

- intensive (present during sensitive ground disturbance)

- intermittent (viewing the trenches after machining)

- partial (as and when seems appropriate).

A **partial** watching brief recommended by GAT for this scheme, to be completed during groundworks for breaching the embankment at the location on Figure 1. The work is scheduled w/c 9th November 2015, with the embankment breaching scheduled on 9th-10th November 2015, after site set-up procedures have taken place. The groundworks will be completed by *Alun Griffiths.*

The **watching brief** will consist of the following:

- Observation of non-archaeological excavation works associated with the breaching of the Morfa Friog, Fairbourne flood alleviation embankment at NGR SH61341438.

- A written and photographic record of the breached embankment and exposed profiles/sections.

- If evidence of any phased make-up of the bank is encountered, a drawn section of the bank profile/section at a scale of 1:20.

- Preparation of full archive report.

3.2 Watching Brief

- Photographic images will be taken using a digital SLR camera set to RAW format and will be converted to TIFF and JPEG format for archiving. Images will be taken of the embankment prior to breaching and record shots will be taken during the breaching works. Images will also be taken of the breached embankment profile/sections;
- A complete table of metadata with details of each photographic image taken, including descriptions and directions of shot, will be produced using Microsoft Access.
- A day record sheet and photographic record sheet will be completed using GAT pro-formas;
- If required , any identified features will be recorded using GAT pro-formas;

- If required, any drawn sections/plans will be completed at either 1:10 or 1:20 scale.
- If encountered, archaeological features/deposits will be manually cleaned and examined to determine extent, function, date and relationship to adjacent features. Limited excavation will be undertaken to characterise the features/ deposits: this strategy will be based on feature type and may include an initial 50% sample of sub-circular features and 10% sample of linear features. Any subsequent excavation required will be detailed in an appropriate **Further Archaeological Works Design**.
- Should dateable artefacts and ecofacts be recovered, an interim report will be submitted summarising the results, along with an assessment of potential for analysis specification (in line with the MAP2 process).

3.3 Environmental Samples

Any deposits deemed suitable for dating will be taken from sealed contexts, with bulk samples from ditches and pit fills proposed as not less than 10 litres from each context. The sampling strategy will be undertaken in accordance with the principles set out in Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (English Heritage, 2011). Recourse will be made to relevant specialists for palaeoenvironmental analysis and dating. Any required specialists will be nominated in a post-excavation project design.

Specific palaeoenvironmental strategies for any peat deposits encountered will be discussed with the GAPS and input from a specialist will be sought during the archaeological watching brief on an appropriate sampling strategy to be rationalised in a *further archaeological works design*. The nominated specialist is Dr. James Rackham of *The Environmental Archaeology Consultancy*
(email : info@e-a-c.co.uk; Telephone: 01529488651)

3.4 Human Remains

Any finds of human remains will be left *in-situ*, covered and protected, and both the coroner and the GAPS Archaeologist informed. If removal is necessary it will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a Ministry of Justice licence is required under Section *25* of the

Burials Act 1857 for the removal of any body or remains of any body from any place of burial. This will be applied for should human remains need to be investigated or moved.

3.5 Small Finds

The vast majority of finds recovered from archaeological excavations comprise pottery fragments, bone, environmental and charcoal samples, and non-valuable metal items such as nails. Often many of these finds become unstable (i.e. they begin to disintegrate) when removed from the ground. All finds are the property of the landowner; however, it is Trust policy to recommend that all finds are donated to an appropriate museum where they can receive specialist treatment and study. Access to finds must be granted to the Trust for a reasonable period to allow for analysis and for study and publication as necessary. All finds would be treated according to advice provided within *First Aid for Finds* (Rescue 1999). Trust staff will undertake initial identification, but any additional advice would be sought from a wide range of consultants used by the Trust, including National Museums and Galleries of Wales at Cardiff and ARCUS at Sheffield.

Unexpected Discoveries: Treasure Trove

Treasure Trove law has been amended by the Treasure Act 1996. The following are Treasure under the Act:

- *Objects other than coins* any object other than a coin provided that it contains at least 10% gold or silver and is at least 300 years old when found.
- *Coins* all coins from the same find provided they are at least 300 years old when found (if the coins contain less than 10% gold or silver there must be at least 10. Any object or coin is part of the same find as another object or coin, if it is found in the same place as, or had previously been left together with, the other object. Finds may have become scattered since they were originally deposited in the ground. Single coin finds of gold or silver are not classed as treasure under the 1996 Treasure Act.
- *Associated objects* any object whatever it is made of, that is found in the same place as, or that had previously been together with, another object that is treasure.
- *Objects that would have been treasure trove* any object that would previously have been treasure trove, but does not fall within the specific categories given above. These objects have to be made substantially of gold or silver, they have to be buried with the intention of recovery and their owner or his heirs cannot be traced.

The following types of finds are not treasure:

- Objects whose owners can be traced.
- Unworked natural objects, including human and animal remains, even if they are found in association with treasure.
- Objects from the foreshore which are not wreck.

All finds of treasure must be reported to the coroner for the district within fourteen days of discovery or identification of the items. Items declared Treasure Trove become the property of the Crown, on whose behalf the National Museums and Galleries of Wales acts as advisor on technical matters, and may be the recipient body for the objects.
The National Museums and Galleries of Wales will decide whether they or any other museum may wish to acquire the object. If no museum wishes to acquire the object, then the Secretary of State will be able to disclaim it. When this happens, the coroner will notify the occupier and landowner that he intends to return the object to the finder after 28 days unless he receives no objection. If the coroner receives an objection, the find will be retained until the dispute has been settled.

3.6 Further Archaeological Works

The identification of significant archaeological features during the archaeological excavation may necessitate the production of a new project design and the submission of new cost estimates to the contractor.

The application of a further archaeological works design (FAWD) will be dependent on the initial identification, interpretation and examination of an archaeological feature and the identification of activity that cannot be addressed within the provisions of the current design, e.g., burials, structures, peat deposits. The requirement for an FAWD will be determined in conjunction with GAPS through established communication lines and the monitoring process.

The FAWD will be instigated through a GAT produced document that will include:

- feature specific methodologies;
- artefact and ecofact specialist requirements, with detail of appropriate sampling strategies and specialist analysis

- timings, staffing and resourcing.
- Additional costs

The FAWD document will need to be approved by the GAPS Archaeologist.

This design does not include a methodology or cost for examination of, conservation of, or archiving of finds discovered during the archaeological excavation, nor of any radiocarbon dates required, nor of examination of palaeoenvironmental samples. The need for these will be identified in the post-fieldwork programme (if required), and a new design will be issued for approval by the GAPS Archaeologist.

3.7 Monitoring Arrangements

The GAPS Archaeologist will need to be informed of the project start date and of the subsequent progress and findings. This will allow the GAPS Archaeologist time to arrange monitoring visits and attend site meetings (if required) and enable discussion about the need or otherwise for FAWDs (if required) as features of potential archaeological significance are encountered.

3.8 Data processing and report compilation

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

- Non-technical summary
- Introduction
- Aims and purpose
- Specification
- Methods and techniques, including details and location of project archive
- Watching Brief Results
- Summary and conclusions
- List of sources consulted.

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.

Photographs of relevant sites and of the study area where appropriate will be included. A draft copy of the report will be sent to the regional curatorial archaeologist (GAPS) and to the client prior to production of the final report.

4 DISSEMINATION AND ARCHIVING

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. All plans, photographs and descriptions will be labelled and cross-referenced, and lodged in an appropriate place (to be decided in consultation with the regional Historic Environment Record) within an agreed submission period.

- A digital report will be provided to GAPS;

- Two copies of the paper report plus a digital report and archive on optical disc will be provided to Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of report completion

- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales.

- A paper report(s) plus digital report(s) will be provided to the client.

4.1 Historic Environment Record

In line with the regional Historic Environment Record (HER) requirements, the HER must 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. At the onset, the HER Enquiry Form provided by the HER, will be completed and submitted.

5 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section and atteneded by a Project Archaeologist. The project archaeologist will be responsible for field management duties, including liaison with GAPS and client. The project archaeologist will be responsible for completing day record sheets as well as all other on site pro-formas and will also archive all written, drawn and digital data. The project archaeologist will also be responsible for submitting a draft final report for project manager review and approval. The report will then be submitted as per the arrangements defined in para. 5.

6 HEALTH AND SAFETY

The GAT Project Archaeologist will be CSCS certified. Copies of the site specific risk assessment will be supplied to the client and site 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 staff will be issued with required personal safety equipment, including high visibility jacket, steel toe-capped boots and hard hat.

7 INSURANCE

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 22/06/2016

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 22/06/2016

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 23/07/2016

8 SOURCES CONSULTED

British Geological Survey *Online Geology of Britain Viewer*

Black & Veatch drawing 109448-02 and 109448-03

Chartered Institute for Archaeologists 2014 *Standards and Guidance for an archaeological watching brief*

English Heritage, 1991, Management of Archaeological Projects

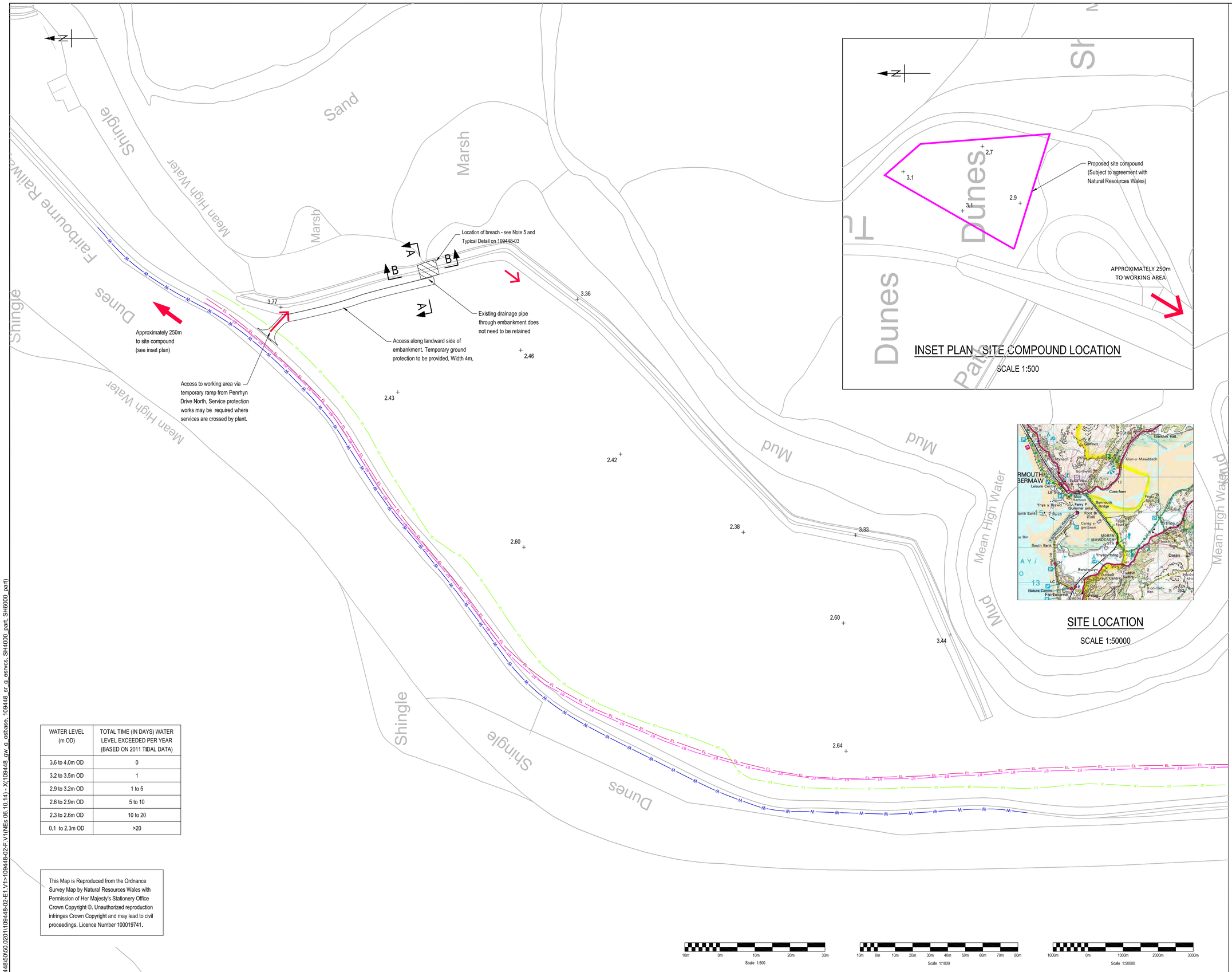
English Heritage 2015. *Management of Research Projects in the Historic Environment (MoRPHE)*.

Evans, R. 2014 *Fairbourne Flood Defences Renewal, Fairbourne, Gwynedd: Archaeological Building Recording and Watching Brief*. GAT Report 1209

Regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor LL57 2RT)

9 FIGURE 01

9.1 Reproduction of Black & Veatch drawing 109448-02



INSET PLAN SITE COMPOUND LOCATION

SCALE 1:500

SITE LOCATION

SCALE 1:50000

WATER LEVEL (m OD)	TOTAL TIME (IN DAYS) WATER LEVEL EXCEEDED PER YEAR (BASED ON 2011 TIDAL DATA)
3.6 to 4.0m OD	0
3.2 to 3.5m OD	1
2.9 to 3.2m OD	1 to 5
2.6 to 2.9m OD	5 to 10
2.3 to 2.6m OD	10 to 20
0.1 to 2.3m OD	>20

10m 0m 10m 20m 30m
Scale 1:500

10m 0m 10m 20m 30m 40m 50m 60m 70m 80m
Scale 1:1000

1000m 0m 1000m 2000m 3000m
Scale 1:50000

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

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Ewrop & Chymru: Buddsoddi yn eich dyfodol
Cronfa Datblygu Rhanbarthol Ewrop
Europe & Wales: Investing in your future
European Regional Development Fund

Notes

1. Site access route and compound location to be agreed with Natural Resources Wales. The tidal nature of the site should be considered.
2. Topographic survey of the site is provided in the Works Information.
3. Services on this drawing obtained from plans provided by Service Providers (dated May 2014) and service tracing survey (July 2013).
4. The suitability of the existing bank for tracking plant along (including its stability) has not been assessed.
5. The breach should be centred on the existing drainage pipe.

Legend

- EL — Electricity (Hv) underground (from Survey)
- BT — BT underground (from Survey)
- UI — Unidentified Service (from Survey)
- W — Water Main (from service plans)
- Proposed Site Compound

Safety Health and Environmental information
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:
Construction. 1. No specific risks identified.
Maintenance/Cleaning/Operation. 1. No specific risks identified' as other headings
Decommissioning/Demolition. 1. No specific risks identified.

Rev	Drawn	Chkd	Rvwd	Apprvd	Date	Description
F	NEs	MDR	TPMP	TPMP	06.OCT.14	CONSTRUCTION ISSUE
E	SPJ	MDR	EAS	EAS	30.JUL.14	CONSTRUCTION ISSUE
D	PRY	MDR	EAST	TPMP	17.JUN.14	CONSTRUCTION ISSUE
C	SPJ	MBo	EAS	EAS	21.JUN.13	LOCATION OF DUNE SCRAPE AMENDED
B	SPJ	MDR	EAST	EAST	30.MAY.13	PLANNING APPLICATION
A	SPJ	MDR	EAST	TPMP	22.APR.13	RAG LIST SIGN OFF

Designed by: MDR Date: 19.MAR.13

Client

Cyfoeth Naturiol Cymru Natural Resources Wales

Client Drawing No. | Revision

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Black & Veatch Limited
Grosvenor House, 69 London Road, Redhill, Surrey, RH1 1LQ, United Kingdom
Tel: +44(0)1737 774155

Project

MORFA FRIOG
SALTMARSH HABITAT CREATION

Drawing title

GENERAL ARRANGEMENT AND SERVICE PLAN

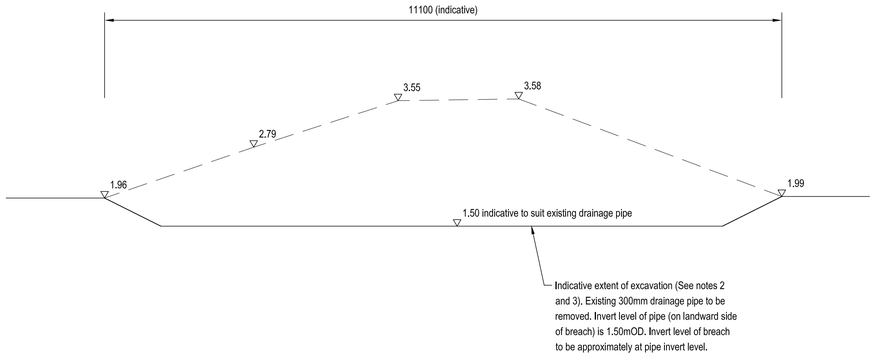
Drawing scale: AS SHOWN Sheet size: A1

Drawing no. 109448 – 02 | Revision F

109448\50\50.02\01\109448-02-F.V1>109448-02-F.V1(NEs 06.10.14) - X(109448_gw_g_osbase, 109448_sr_g_esrvcs, SH4000_part, SH6000_part)

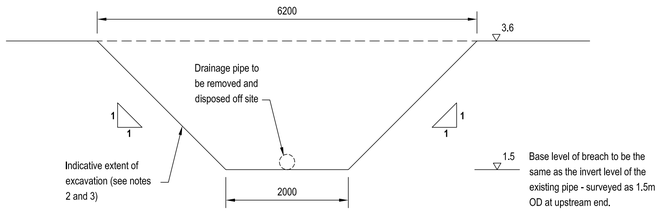
10 FIGURE 02

10.1 Reproduction of Black & Veatch drawing 109448-03



SECTION AA

SCALE 1:50



SECTION BB - TYPICAL DETAIL OF "REDUCED" BREACH

SCALE 1:50

WATER LEVEL (m OD)	TOTAL TIME (IN DAYS) WATER LEVEL EXCEEDED PER YEAR (BASED ON 2011 TIDAL DATA)
3.6 to 4.0m OD	0
3.2 to 3.5m OD	1
2.9 to 3.2m OD	1 to 5
2.6 to 2.9m OD	5 to 10
2.3 to 2.6m OD	10 to 20
0.1 to 2.3m OD	>20

Note: The limits, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

ERDF
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Welsh Government
Ewrop & Chymru: Buddsoddi yn eich dyfodol
Cronfa Datblygu Rhanbarthol Ewrop
Europe & Wales: Investing in your future
European Regional Development Fund

Notes

1. Topographic survey of the site is provided in the Works Information.
2. Excavated surface to be graded with machine bucket or similar. No formal topsoiling or reinstatement required. Base of breach should be excavated to allow free flow of water between existing small channel at downstream end of existing pipe (to be removed) and existing low area at its upstream end.
3. All excavated material to be removed from site and disposed of at an appropriate waste management facility. Natural Resources Wales consent required prior to recycling or re-use at alternative locations.

Safety Health and Environmental information
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following:
Construction. 1. No specific risks identified.
Maintenance/Cleaning/Operation. 1. No specific risks identified.
Decommissioning/Demolition. 1. No specific risks identified.

1m 0m 1m 2m 3m
Scale 1:50

Rev	Drawn	Chkd	Rvwd	Apprvd	Date	Description
C	NEs	MDR	TPMP	TPMP	06.OCT.14	CONSTRUCTION ISSUE
B	PRY	MDR	EAST	TPMP	17.JUN.14	CONSTRUCTION ISSUE
A	SPJ	MDR	EAST	TPMP	22.APR.13	RAG LIST SIGN OFF

Designed by: MDR Date: 19.MAR.13

Client

Cyfoeth Naturiol Cymru
Natural Resources Wales

Client Drawing No. | Revision

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Tel: +44(0)1737 774155

Project

MORFA FRIOG
SALTMARSH HABITAT CREATION

Drawing title

SECTIONS AND DETAILS

Drawing scale: 1:50 Sheet size: A1

Drawing no. 109448 – 03 | Revision C

APPENDIX II

Reproduction of photographic metadata

File reference	Project name	Project phase	Contexts	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Use Y/N
G2440_001.jpg	G2440 Morfa Friog	Watching Brief	100-106	View of Morfa Friog Embankment Section Cut (oblique)	SSW	1x1m	Photo graph	10/03/15	Robert Evans	Gwynedd Archaeological Trust	
G2440_002.jpg	G2440 Morfa Friog	Watching Brief	100-106	View of Morfa Friog Embankment Section Cut (oblique)	NNE	1x1m	Photo graph	10/03/15	Robert Evans	Gwynedd Archaeological Trust	
G2440_003.jpg	G2440 Morfa Friog	Watching Brief		View along the embankment	E	-	Photo graph	10/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_004.jpg	G2440 Morfa Friog	Watching Brief		View of East facing section from the embankment	E	1x1m	Photo graph	10/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_005.jpg	G2440 Morfa Friog	Watching Brief		View of cut through the embankment	S	1x1m	Photo graph	10/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_006.jpg	G2440 Morfa Friog	Watching Brief		View of cut through the embankment	N	1x1m	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	
G2440_007.jpg	G2440 Morfa Friog	Watching Brief		General shot along embankment, showing work area	NE	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_008.jpg	G2440 Morfa	Watching Brief		General shot along	N	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological	Y

File reference	Project name	Project phase	Contexts	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Use Y/N
	Friog			embankment, showing work area						Trust	
G2440_009.jpg	G2440 Morfa Friog	Watching Brief		General shot along embankment, showing work area	NNW	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	
G2440_010.jpg	G2440 Morfa Friog	Watching Brief		East facing bank section after machining	E	1x1m	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	
G2440_011.jpg	G2440 Morfa Friog	Watching Brief		West facing section through the bank after machining	W	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_012.jpg	G2440 Morfa Friog	Watching Brief		View along embankment from the Penrhyn estuary	W	1x1m	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_013.jpg	G2440 Morfa Friog	Watching Brief		General view of embankment	NW	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	Y
G2440_014.jpg	G2440 Morfa Friog	Watching Brief		General view of embankment	SE	-	Photo graph	11/03/15	Robert Evans	Gwynedd Archaeological Trust	

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