



MINISTRY OF DEFENCE

**Defence  
Infrastructure  
Organisation**

## **DYFI ESTUARY, WALES**

**January 2012 Target Detection and  
Extraction**

*Phase II/ III Explosive Ordnance Risk  
Assessment*

May 2012

Environmental Science Group Report ESG/12/047

## DYFI ESTUARY, WALES PHASE II/ III Explosive Ordnance Risk Assessment

ESG/12/047  
May 2012

Report Prepared for:

Lt R Balfour,  
Officer-in-Charge,  
Southern Diving Unit 1,  
HMNB Devonport

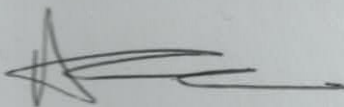
This Explosive Ordnance Risk Assessment (EORA) should be used for the following purposes:

- Identification of areas of potential land contamination (or areas of concern). These should be included in the site risk register;
- Identification of areas of concern to be included in Part 4b of the Statement of Known Hazards (relating to potential for underground obstructions, buried ordnance and buried chemicals or hazardous substances);
- Provision of information to regulatory bodies (primarily the Local Authority and Environment Agency, or SEPA in Scotland).

The EORA is 'owned' by the Head of Establishment (HoE) who should nominate the most suitable person for storage and upkeep of the information (e.g. Site Estates Representative (SER), Site Environmental Protection Officer (EPO), Site Safety, Health, Environment and Fire (SHEF) representative).

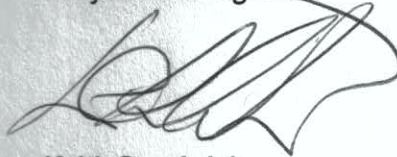
This statement is endorsed by Defence Estates.

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This document has been prepared for Dyfi Estuary, Wales. Feedback from site staff is encouraged and questions regarding the report welcomed. ESG has expertise in various environmental areas including waste management, land remediation, environmental chemistry and environmental engineering. The group's core functions are:

- **Land Quality Assessment**
- **Environmental Risk Assessment**
- **Demilitarisation of Land**

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## Acronyms

CCW	Countryside Council for Wales
CDS	Chief of the Defence Staff
CESO	Chief Environmental Safety Officer
DES	Defence Equipment and Support
DIO	Defence Infrastructure Organisation
ESG	Environmental Science Group
GPS	Global Positioning System
Ha	Hectare
HE	High Explosive
HMNB	Her Majesty's Naval Base
iaw	in accordance with
OIC	Officer in Charge
MACP	Military Aid to the Civil Power
NC	Navy Command
nT	nanoTesla
pdr	pounder
SDU1	Southern Diving Unit 1
SJC	Standing Joint Commander
SLA	Service Level Agreement
UXO	Unexploded Ordnance

# 1 INTRODUCTION

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## 1.1 Tasking

The Environmental Science Group (ESG) of Defence Infrastructure Organisation (DIO) were tasked by Lt R Balfour, OIC Southern Diving Unit 1 (SDU 1), HMNB Devonport, to undertake a Phase II assessment (target detection) and Phase III (target extraction) at a former military range within the Dyfi estuary, Wales<sup>1</sup>.

The Phase II survey was carried out by ESG during the week beginning 12<sup>th</sup> September 2011 with support from the Countryside Council for Wales (CCW). A subsequent Phase III extraction of targets was carried out during the week beginning 23<sup>rd</sup> January 2012 by ESG and SDU1.

## 1.2 Objectives

Aims and objectives of both phases were as follows:

- to capture magnetometer data over as much of the intended area as reasonably practicable;
- identification and extraction of potential ordnance;
- progress in a logical and sequential manner in order to clear the area of ordnance;
- provide auditable evidence of activity to prepare for future operations and ultimately secure the area.

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<sup>1</sup> SLA CESO NC and DES dated Nov 2008

## 2 SITE DESCRIPTION

### 2.1 Site Location

The survey was conducted over a 9Ha area within the Dyfi Estuary, Borth, which is located to the north of Aberystwyth, Wales. An overview of the extent of the surveyed area is included in Figure 1.

The approximate grid coordinates for the survey area are:

**Table 1:** approximate grid coordinates of the survey area in three different systems.

Coordinate Type		
WGS 84/ UTM zone 30N	430500 (Easting)	5820300 (Northing)
Ordnance Survey	262800 (Easting)	294200 (Northing)
Latitude/ Longitude	4:01:28W	52:31:42N

### 2.2 Current Site Use and Conditions

The former military range covers the large estuary area of the River Dyfi which is approximately 2000ha size. The estuary is predominantly sandy in nature with salt marshes fringing its southern edge. Within the estuary river channels meander in a westerly direction towards the sea. The river channels and terrain of this area are significantly dynamic in nature, and likely to result in the exposure of previously buried ordnance.

On the southern section of the estuary's mouth, the Ynys-Las nature reserve comprises of open sandy/ shingle beaches with sand dunes. This area was the principal location of the historic military camp. Several former buildings and bunkers are still present. The river Afon Leri acts as a division between the Ynys-Las nature reserve and the main estuary area to the east.

### 2.3 Background Information

The 'Ynys-Las Range' was initially built between 1942 and 1943, and was not just confined to the Ynys-Las peninsular, but covered the entire Dyfi estuary. During the construction stage of the range HMV Camroux was anchored at Aberdyfi to act as accommodation, then subsequently used to carry out a detailed survey in 1943 (Appendix C). This survey mapped the main batteries and observation posts surrounding the entire Dyfi estuary, but not the concrete bases for the aerial trackways, which were added at a later date. The nature of the items fired from these batteries is uncertain, but evidence suggests that they were used to test and practice the firing of both sea mattress and land mattress rocket systems. In addition, there is evidence that the estuary was used as a location for practising the beach landings. Over recent years ordnance recovered from the estuary has consisted of rockets, HE mortars, naval shells and anti-tank rounds, supporting these assumptions.

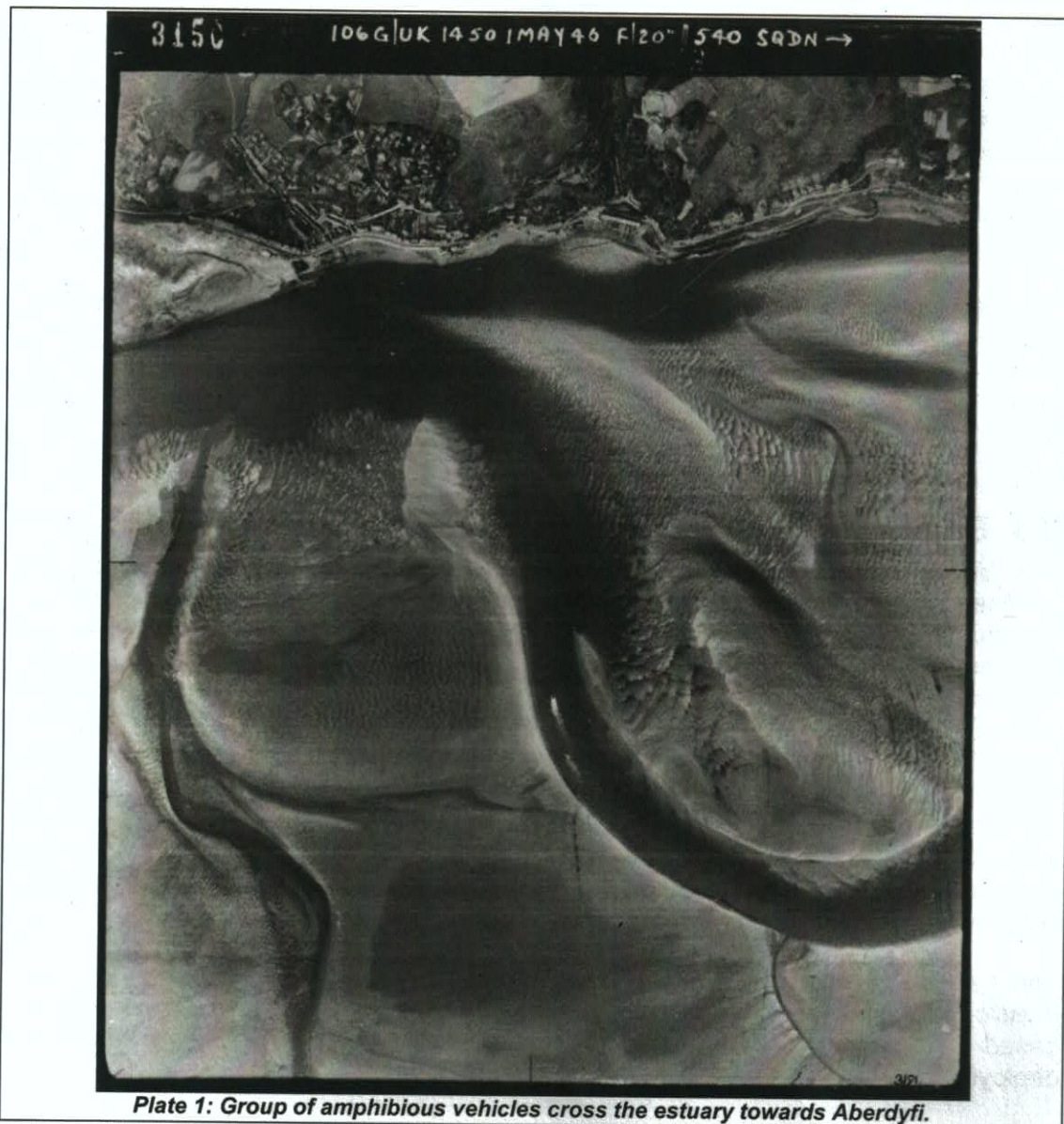
The sea mattress rocket system was developed by 1944 and used during the invasion of Sicily (July to August 1943) and D-Day (6<sup>th</sup> June 1944). The system was based on a 5 inch rocket capable of firing 800-1000 rounds in 45 seconds, and deployed on warships and landing craft.

The land mattress system was based on the Royal Navy concept but utilised a smaller 3 inch rocket system which was deployed from trucks and self-propelled

tracked vehicles. The system was brought into service during late-1944 and used in the Battle of the Scheldt.

In 1945 the range became MoS EE AA (Ministry of Supply Experimental Establishment Anti-Aircraft) Ynyslas and used as a missile-testing site to evaluate the effectiveness of solid fuel in comparison to liquid fuels. This was known as the LOPGAP (Liquid Oxygen and Petroleum Guided Anti-Aircraft Projectile) project. During this period the range appears to have been restricted to the Ynys-Las section of the estuary, where two overhead trackways were built to test the motor systems. The range was active until 17<sup>th</sup> May 1946 at which point the research and range activity was moved to MOS Aberporth.

Between November 1945 and November 1947 there is evidence that the estuary was also used for training by Royal Army Service Corps Amphibious Training unit at Tywyn. Aerial photography captured in May 1946 (Plate 1) shows a crossing of a group of amphibious vehicles crossing the estuary from south to north, towards the harbour of Aberdyfi where the vehicles were reportedly moored.





### 3 SURVEY METHODOLOGY

Search areas were planned and defined prior to the survey during discussions between ESG and SDU1, with priority given to the estuary area. A subsequent meeting was held before the target extraction phase which was held at HMNB Devonport between ESG and SDU1.

#### 3.1 Phase II: Target Detection

##### 3.1.1 Summary of Acquisition Parameters

The survey was carried out using the following acquisition parameters:

**Table 2:** Summary of acquisition parameters.

Geophysical Methodology	Magnetic Survey
Area Surveyed	9Ha
Geophysical Equipment	4m magnetometer array utilising 8 Foerster CON650 gradiometer sensors.
Sensor Spacing	0.5m
Sensor Sensitivity	<0.2nT
Surveying Equipment	Trimble 5700 RTK GPS
Positional Accuracy	<10cm
GPS Base Station used	Borth East

##### 3.1.2 Survey Acquisition

Data was acquired utilising a purpose-made vehicle towed magnetometer array, designed to provide high resolution datasets and rapid acquisition rates. The aim of the survey was to defining the precise location of suspect ferrous items or areas.

For this specific survey, ESG employed a vehicle towed 4m wide magnetometer array. The array was fitted with 8 Foerster CON650 magnetometers, orientated vertically at 0.5m intervals along the width of the array (Plate 2). Due to the challenging nature of the terrain and the requirement to access the sands via the salt marsh, a tracked Argocat vehicle was used to tow the array. The Argocat was owned and operated by CCW.



**Plate 2:** 4m array fitted with 8 probes towed by a tracked Argocat within the Dyfi estuary.



All positions were recorded in real time kinematic (RTK) mode using Trimble 5700 GPS units for both base station and rover units. The array was fitted with a single Trimble Zephyr antenna. GPS data was recorded at one second intervals with a linear interpolation applied to fill any gaps.

### 3.1.3 Survey Data Capture and Evaluation

The sensors were attached to Foerster 4.032 PNC controllers that were linked to Foerster Datamonitor software. This ensured that the whole area was surveyed and there were no uncontrolled gaps within the data. Data was captured at 0.1m intervals in the direction of travel, and synchronised with the GPS NMEA input. The data was then exported into Foerster Dataline. This allowed an initial evaluation of the data and compensation for the tow vehicle and direction of travel. An initial display of the data is also generated.

Using Oasis Montaj Graphical Information System (GIS), the surveys were combined and displayed upon a base map of the area. This allows the entire site to be analysed and areas of potential concern to be identified.

### 3.1.4 Safety

The towed array method used for this survey was not considered to pose a significant risk of initiating surface or shallow ordnance. Initiation is possible by either imparting energy into the ground or physical impact of the tow vehicle or array. As the arrays sensors are passive, physical impact was deemed the only risk. Risk is managed by understanding the potential for blind munitions to be present at a site, and their nature. Additionally, visual clearances are carried out where necessary prior to entering a survey area with an array. The risk to personnel conducting the survey was deemed to be low.

## 3.2 Phase III: Target Extraction

Target locations were relocated by ESG using a Trimble 5700 RTK GPS, and then depth assessed using a Geonics EM61 Mk2. Those that had a response above 200mV on the earliest time gate were staked out and extracted by SDU 1. Target finds were recorded by SDU 1, who then supplied information back to ESG.

## 3.3 Positional Surveying

Three survey stations have been established within the Dyfi estuary by ESG, for the purpose of data acquisition and target relocation. The coordinates supplied are in OSTN02.

**Table 3:** Survey stations present within the Dyfi Estuary.

Name	Coordinates	Description
Borth West	260900.790 (E) 294575.310 (N) 57.280 (Ht)	In a post within the Ynys-Las nature reserve north of the main car park.
Borth Centre	261713.792 (E) 293493.014 (N) 57.229 (Ht)	Fence post immediately east of the Afon Leri on the land side of the sea defences.
Borth East	262853.089 (E) 293592.213 (N) 57.427 (Ht)	Nail with yellow disc on a WW2 concrete access ramp east of Afon Leri.

## 4 RESULTS

Results from both phases of work are presented in Figure 2 as a colour contour plot of the survey results with the locations of the extracted ordnance overlaid. The location of all recorded items of ordnance from the previous two Royal Navy clearance operations are included in Figure 3, with a site location map shown in Figure 1.

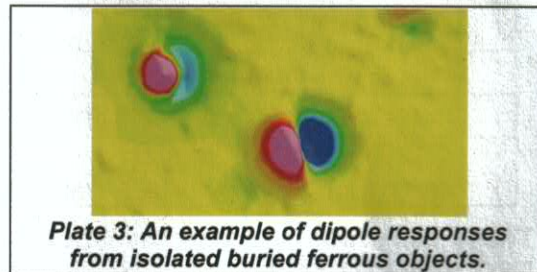
### 4.1 Phase II: Target Detection

#### 4.1.1 Generalised Discussion of Magnetic Results

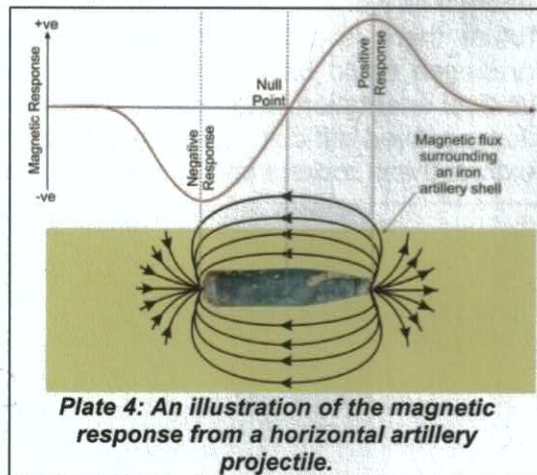
The aim of this magnetic survey was to locate potential ordnance, through mapping localised anomalies in the Earth's magnetic field resulting from man-made ferrous (e.g. iron/ steel) objects, such as artillery projectiles.

Magnetic gradiometers were utilised, with each containing two sensors with a fixed 650mm vertical spacing. Both sensors measure the Earth's total magnetic field, with the data logger recording the difference between these reading in nano Tesla (nT), with a sensitivity of <math><0.2\text{nT}</math>. This method effectively compensates for variations in the Earth's magnetic field and reduces the effect of local interference.

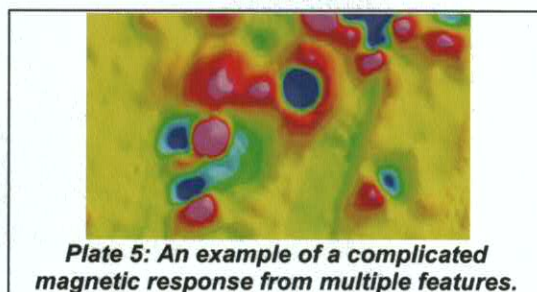
In order to appreciate the images presented in this report, it should be noted that for each discrete anomaly there is usually both a positive and negative response, indicated as red and blue respectively on the images. An example of this is shown through the adjacent image (Plate 3).



Using a horizontal artillery projectile as an example, the field measured will be positive at one end and negative at the other (Plate 4). A null point will be located close to the centre. As the shell is tilted upwards, one of the readings increases and the other decreases. When in a vertical position, the reading is shown as a positive centre surrounded by a weaker negative ring.



In an area where multiple features are present (Plate 5), the collective magnetic signature of these features will generally be complicated. When this type of response is observed several features should be expected, with the response from larger features occasional masking smaller features. Additional surveys are advised after target extraction in these areas.



#### 4.1.2 Survey Results

A colour contour plot of the magnetometer dataset acquired during September 2011 is presented along with the location and description of the items of ordnance recovered in Figure 2. Numerous large isolated anomalies were present throughout the survey area with 176 initially identified for investigation. Ordnance contamination appears to be extensive across the surveyed area, and it does not appear that fade out has been achieved.

In order to investigate the shallower and therefore more accessible anomalies, the locations identified were characterised further using a Geonics EM61 Mk2 metal detector with those anomalies producing the largest response prioritised. This reduced the locations investigated to between 40 and 50.

#### 4.2 Phase III: Target Extraction

A summary description of the recorded target finds from the January 2012 tasking is shown below, and an image of recovered munitions is included in Plate 6. Further selected images of recovered ordnance are included in Appendix A.

**Table 4:** Summary of recorded items recovered during June 2011 extraction phase.

Type	Number
3" Land Mattress	8
5" Sea Mattress	13
25lb Armour piercing shell	1
3" HE Mortar (recovered during surface walkover)	3

These items were recorded by SDU 1, and also include items not included on the ESG target list as they were identified by visual clearance. A significant number of anomalies were not investigated as they were too deep to recover, therefore if in the future there is a significant decrease (>1m) in beach elevations further items of ordnance could be extracted. In general the recovered rockets were located in a vertical orientation, and given their length of 1.77m, extraction of even the shallowest items proved difficult. Future extraction tasks may require mechanical assistance to extract these rockets and increase recovery rates.



**Plate 6:** Expended and inert munitions recovered during January 2012.

## 5 CONCLUSIONS

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1. Two phases of work comprising of UXO target detection and extraction have been carried out within the Dyfi Estuary by the Environmental Science Group (ESG) and Southern Diving Unit 1 (SDU 1).
2. The Phase II survey covered 9Ha and showed numerous ferrous anomalies across the survey area, with a total of 176 targets initially identified for investigation. Anomalies were extensive across the surveyed area, and 'fade out' does not appear to have been achieved.
3. The target list was further refined using an EM61 Mk2 metal detector to target the shallower more accessible anomalies. Those producing the largest response were prioritised, which reduced the locations investigated to approximately 40-50.
4. Twenty two items of ordnance were recovered as a result of the target list which included 8 x 3" Land Mattress, 13 x 5" Sea Mattress and 1 x 25lb Armour piercing shell. SDU 1 recovered a further 3 x 3" HE Mortar during visual clearance.

## 6 RECOMMENDATIONS

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1. Within the surveyed area the likelihood that ordnance is located within the top 1m has been greatly reduced. Therefore unless significant decreases in beach elevations (>1m) occur, clearance priority should focus on areas outside of this investigation area.
2. On future tasks, in order to prioritise shallower more accessible targets, further characterisation of the magnetic anomalies should be carried out by an active time-domain electromagnetic system, such as a Geonics EM61 Mk2 or Vallon/ Foerster Minex metal detector.
3. The rockets recovered during this task were generally orientated in a vertical orientation and proved difficult to extract. Mechanical assistance on future tasks should be considered to see if this will increase the recovery rate of these rockets.
4. Continue to record all items of ordnance recovered within this former military site in order to assess the extent and nature of contamination present.



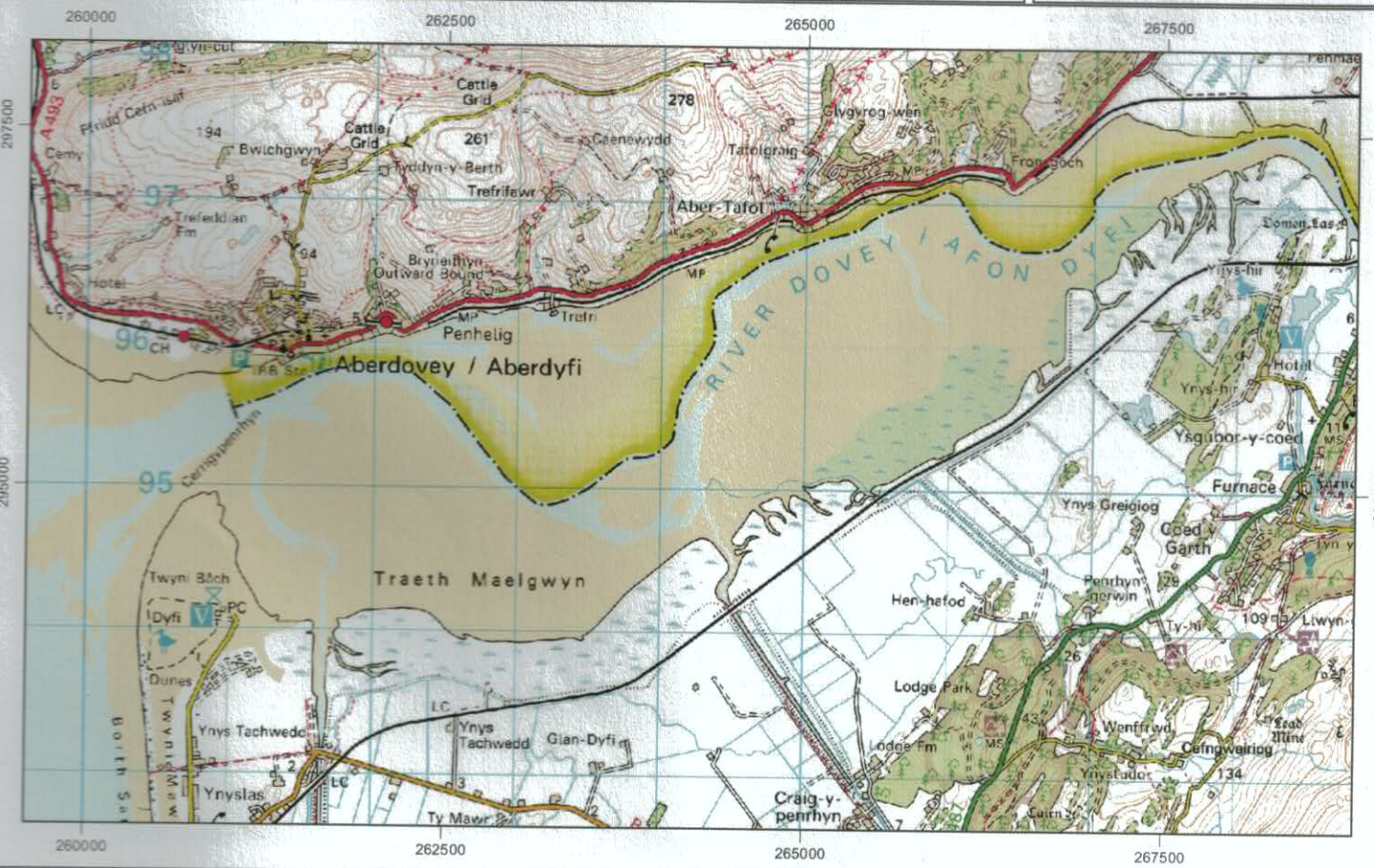
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**Figure 1:**  
 Location of Site and  
 Survey Area

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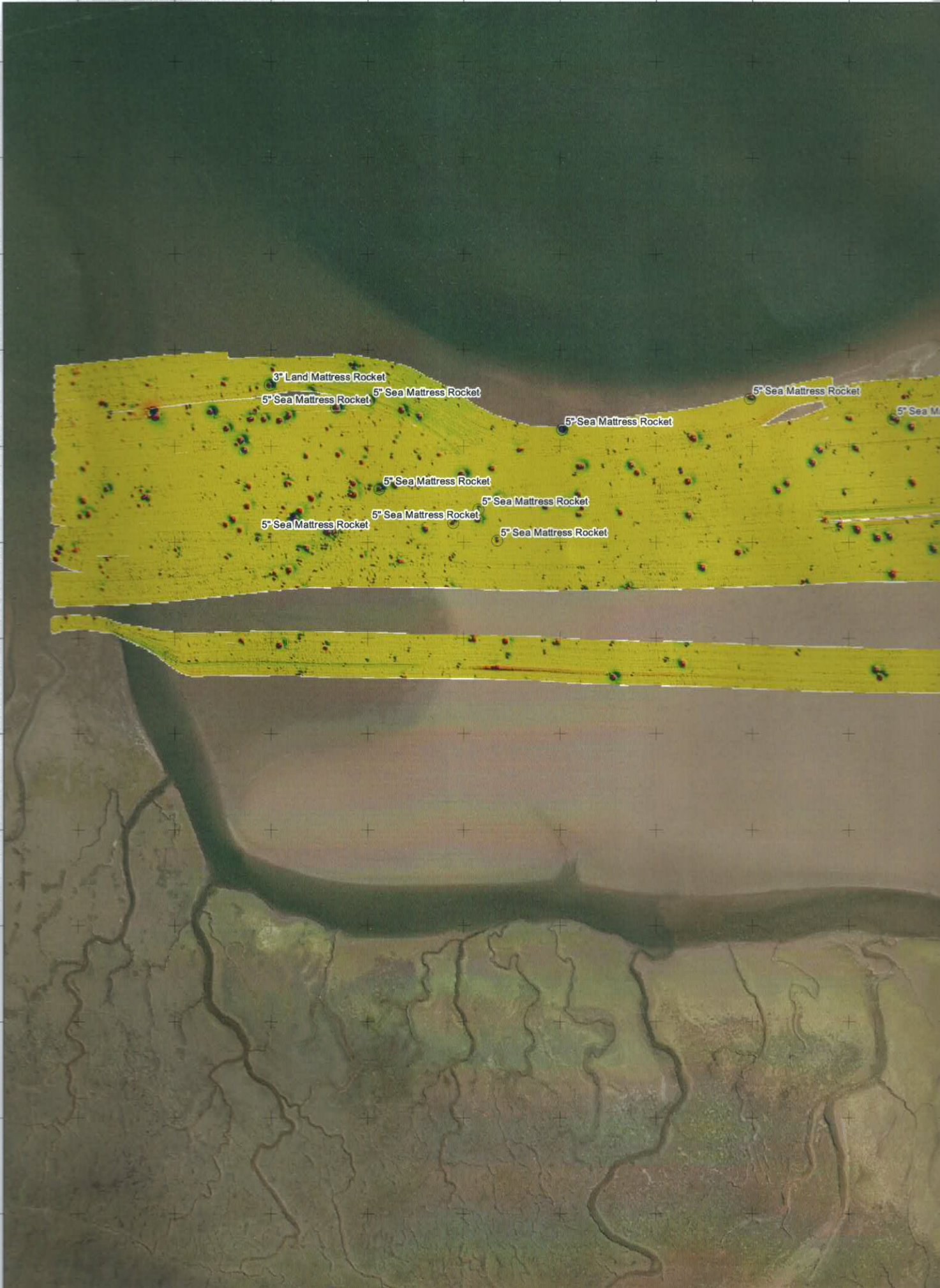
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Wales

### Figure 2: Survey Results with Ordnance Extracted during January 2012

#### KEY

-  Recovered Ordnance
-  Magnetometer Survey

#### USER NOTE

Magnetometer data acquired September 2011, with ordnance extracted January 2012. Anomalies were assessed for depth prior to extraction, therefore in general the features remaining may represent ordnance at a greater depth below the surface.

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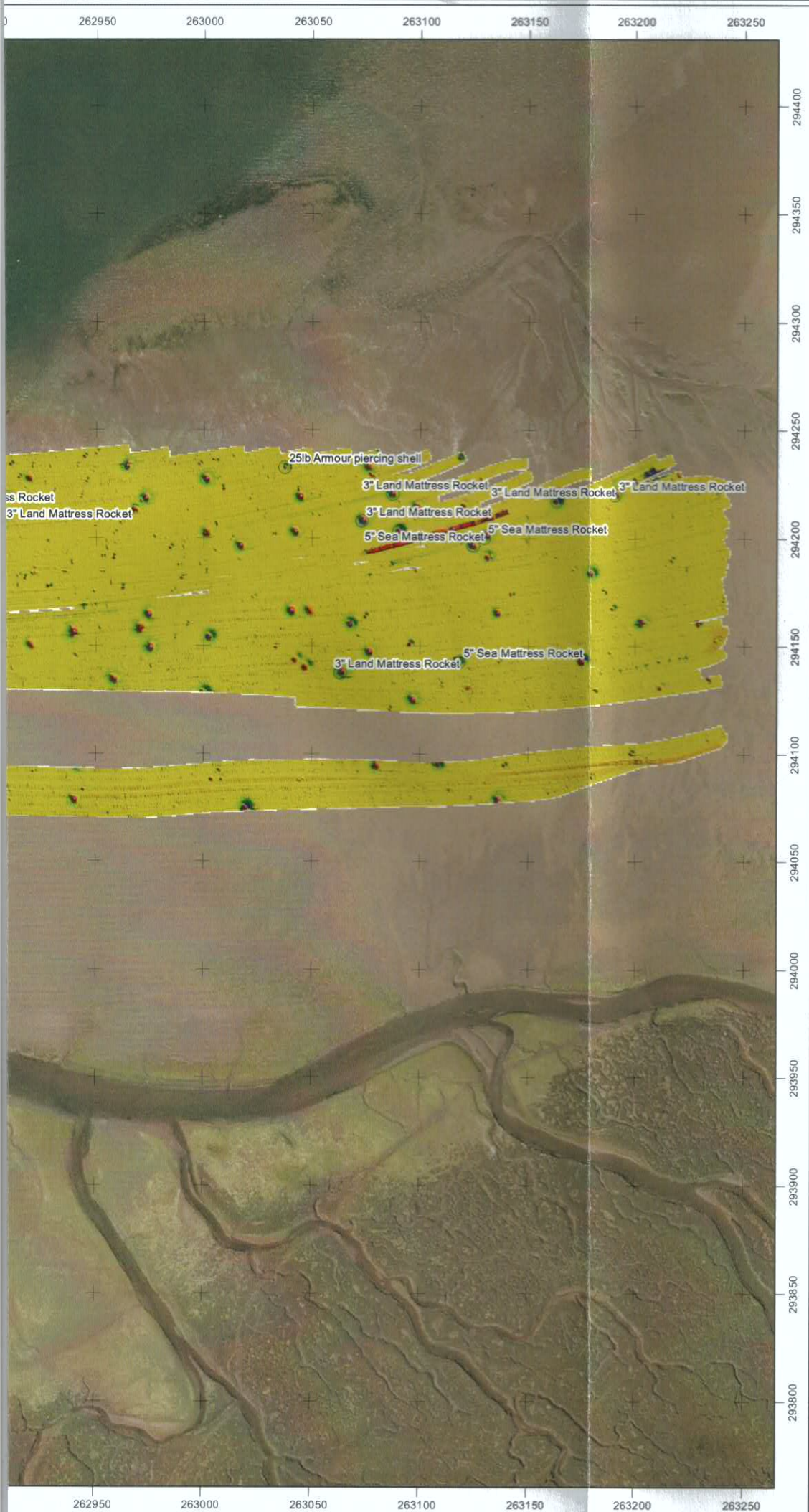
**Production Date:**  
15th May 2012

**Drawn By:**  
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**Checked By:**  
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260500

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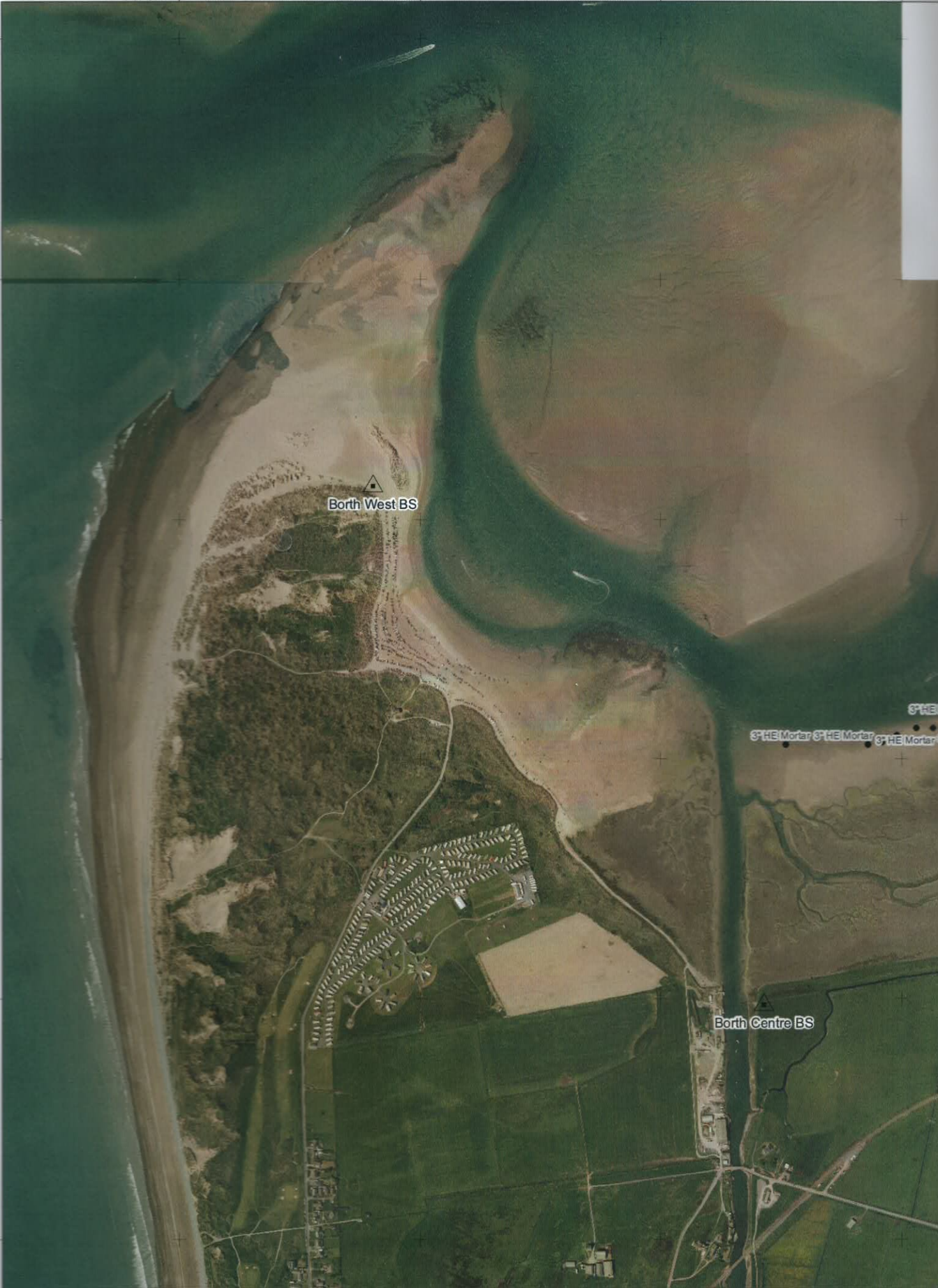
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Borth West BS

Borth Centre BS

3' HEI Mortar 3' HEI Mortar 3' HEI Mortar

260500

261000

261500

262000

262500

263000

263500



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Wales

### Figure 3: Recorded Locations of Recovered Ordnance

#### KEY

▲ ESG Base Stations

● Recovered Ordnance

#### USER NOTE

- 1) Locations relate to ordnance recorded during the current and previous clearance taskings carried out by SDU 1.
- 2) Base stations were installed by ESG with co-ordinates included in the report.

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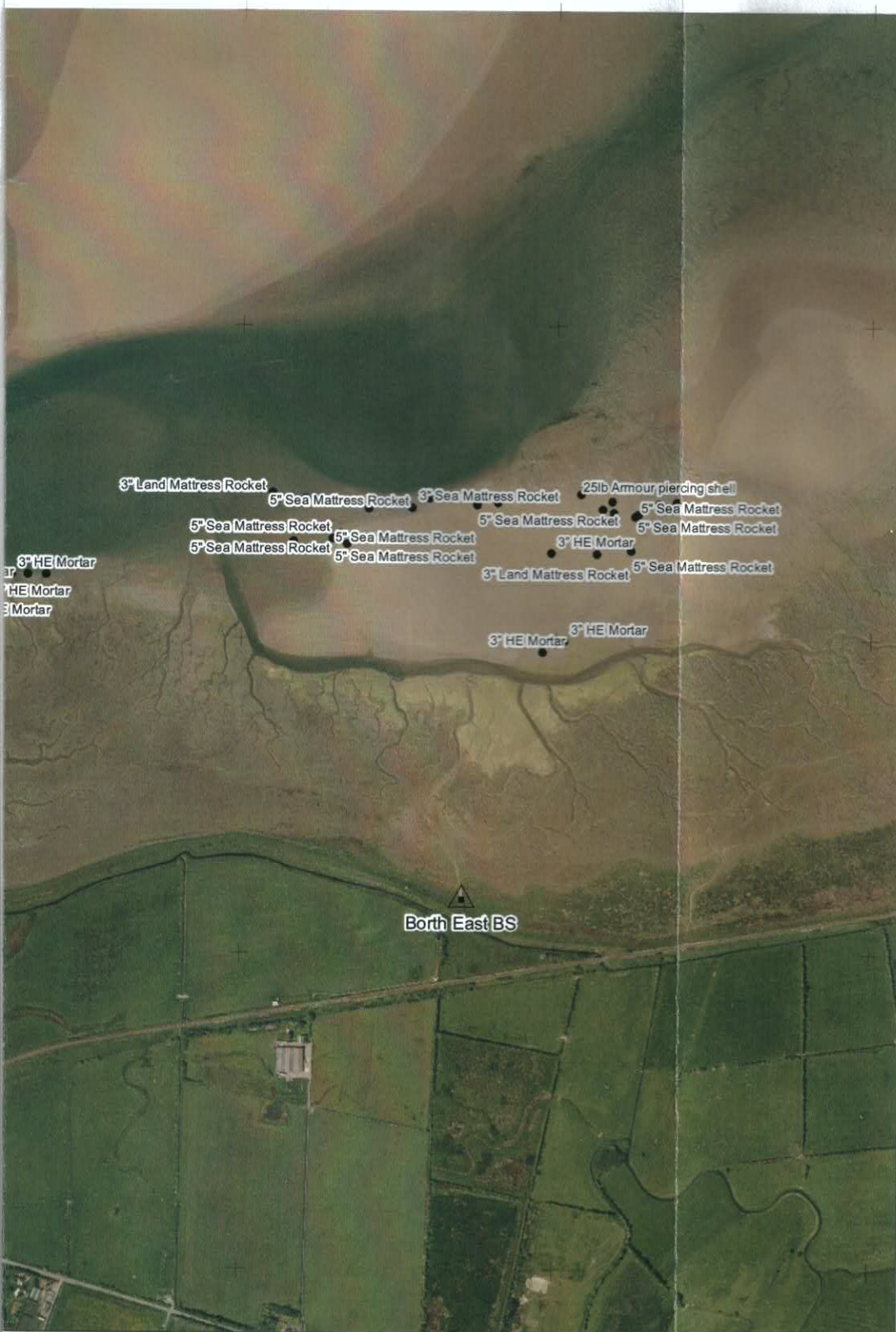
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## Appendix A

### SELECTED IMAGES OF TARGET FINDS

(Additional target information is held by  
ESG and available on request.)

**Munitions extracted during the  
January 2012 investigations**



**Munition** – This target was found to be a 5" Sea Mattress Rocket



**Munition** – This target was found to be a 5" Sea Mattress Rocket head



**Munition** – This target was found to be a 25lb Armour piercing shell



**Total collection of ordnance at the end of the tasking**

## Appendix B

SDU1 REPORT ON PROCEEDINGS  
AND LESSONS IDENTIFIED (PXR)



Navy Command

## Southern Diving Unit 1 (Plymouth)

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File Ref: 325/1/7

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Military: 9375 65386  
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See Distribution

03 Feb 12

### SOUTHERN DIVING UNIT 1 POST EXERCISE REPORT (PXR)

#### PLANNED RANGE CLEARANCE OPERATION, BORTH 23 – 27 JAN 12

##### Introduction

1. Southern Diving Unit 1 (SDU1) conducted a planned beach clearance of Traeth Maelgwyn Sands, Borth. Task No. Fleet/SDG/EOD/01/12, from 23 – 27 Jan 12. The Royal Navy Explosive Ordnance Disposal (EOD) team conducted a combined operation with the Environmental Science Group (ESG) and local area Coastguard.

##### Objectives

2. The following were the stated SDU 1 objectives:
  - a. Carry out a search for conventional munitions.
  - b. Identify and dispose of conventional munitions on site.
  - c. The production of an accurate chart of areas searched and locations of munitions found for future use.
  - d. Training of RN personnel in correct EOD procedures and best practices.
  - e. Provide accurate records to Joint Service Explosive Disposal Operating Centre (JSEODOC) Didcot and ESG for future Operational reference.
3. SDU 1 successfully met the stated objectives.

##### Transport

4. SDU 1 utilised 1 x EOD Hilux and 1 x Crewbus to deploy to Borth.

##### Accommodation

5. No service accommodation was available in the area therefore accommodation was arranged in the Glengower Hotel, Aberystwyth. The hotel was of a satisfactory standard with parking available for Crewbus.

##### Logistics

6. SDU1 utilised its own vehicles to transport all equipment, demolition stores and personnel to the Borth Ranges. Permission was obtained via Mr James Allen (landowner)



for access to the search area; he was kept informed prior to and on completion of operations. The local Police Station facilities were utilised to store the EOD Hilux and all explosive stores overnight.

### **Communications**

7. No formal EMCON policy was produced by the tasking authority and due to the overt nature of the operation all communications were conducted using mobile phones and VHF radios.

### **Outside Agencies**

8. Close liaison was required with the local Coastguard to ensure maritime safety and provide manning to assist with establishing and maintaining effective cordons prior to any demolition serials. Aberystwyth Police were also contacted daily to inform them that EOD operations were taking place. A meeting was held with a representative from the Countryside Council of Wales, where local environmental concerns were discussed. The meeting was very constructive for all parties concerned and it was agreed that there should be closer liaison with this organisation prior to conducting any future operations in Borth therefore, reducing environmental impact to a minimum.

### **Sequence of events**

9. On arrival SDU1 personnel received an induction brief from CPO(D) Kasapi, acting as the Range Safety Officer (RSO), this covered areas to be searched and explosives safety issues. PO(D) Morris and Mr Graham Petrie (ESG) then briefed on the different types of historic munitions that could be expected to be found and in which specific locations they were expected. Finally, briefings were then conducted on key pieces of search and demolitions equipment to re-familiarise SDU1 personnel prior to commencing operations.

10. The range was split into two specific areas to be searched; Area 1 was searched by ESG and backed up by half of the team to prosecute contacts found by ESG search equipment. Area 2 was covered by means of range walking. These walks were carried out daily in order to visually locate munitions above the high water mark, they were focused on the area of the range known to contain Mortars and smaller land service ammunition (LSA) contacts. This was followed by de-scaling procedures to enable the munitions to be formally identified as explosive ordnance. Scrap metal that could easily be removed from the beach was collected into piles to be transported to an area that could be marked (by GPS) as a designated scrap site. This position was shared with ESG to minimise future confusion or repetition of effort. All EOD serials to dispose of munitions were conducted on the final day of operations thus minimising environmental impact and disturbance to the local area.

11. Two members of ESG were on-site throughout the week to plot and direct SDU1 personnel onto targets of interest that were found during a previous survey. ESG representatives worked independently of SDU1 and provided highly accurate and valuable information, allowing SDU1 to significantly reduce spurious searches and concentrate efforts more efficiently.

12. The following Ordnance was found throughout the week and disposed of by explosive means:

No (a)	Ordnance (b)	Latitude (c)	Longitude (d)	Remarks (e)
1	5" Sea Mattress Rocket	52°31.703N	004°01.522W	Moved for disposal
2	5" Sea Mattress Rocket	52°31.682N	004°01.560W	Moved for disposal
3	5" Sea Mattress Rocket	52°31.674N	004°01.551W	Moved for disposal
4	5" Sea Mattress Rocket	52°31.714N	004°01.436W	Moved for disposal
5	5" Sea Mattress Rocket	52°31.679N	004°01.571W	Moved for disposal
6	5" Sea Mattress Rocket	52°31.686N	004°01.604W	Moved for disposal
7	5" Sea Mattress Rocket	52°31.710N	004°01.604W	Moved for disposal
8	5" Sea Mattress Rocket	52°31.711N	004°01.626W	Moved for disposal
9	5" Sea Mattress Rocket	52°31.674N	004°01.625W	Moved for disposal
10	5" Sea Mattress Rocket	52°31.711N	004°01.372W	Moved for disposal
11	5" Sea Mattress Rocket	52°31.704N	004°01.150W	Moved for disposal
12	5" Sea Mattress Rocket	52°31.676N	004°01.152W	Moved for disposal
13	5" Sea Mattress Rocket	52°31.706N	004°01.145W	Moved for disposal
14	3" Land Mattress Rocket	52°31.717N	004°01.114W	Moved for disposal
15	3" Land Mattress Rocket	52°31.719N	004°01.092W	Moved for disposal
16	3" Land Mattress Rocket	52°31.720N	004°01.652W	Moved for disposal
17	3" Land Mattress Rocket	52°31.713N	004°01.343W	Moved for disposal
18	3" Land Mattress Rocket	52°31.668N	004°01.204W	Moved for disposal
19	3" Land Mattress Rocket	52°31.711N	004°01.195W	Moved for disposal
20	3" Land Mattress Rocket	52°31.708N	004°01.179W	Moved for disposal
21	3" Land Mattress Rocket	52°31.718N	004°01.180W	Moved for disposal
22	3" HE Mortar	52°31.671N	004°01.264W	Moved for disposal
23	3" HE Mortar	52°31.586N	004°01.272W	Moved for disposal
24	3" HE Mortar	52°31.596N	004°01.242W	Moved for disposal
25	25lb Armour piercing shell	52°31.723N	004°01.225W	Moved for disposal

13. The following coordinates are for use in future operations.

Site/Area (a)	Latitude (b)	Longitude (c)	Remarks (d)
Scrap Metal	52°31.703N	004°01.509W	
Demolition site Jan 2012	52°31.690N	004°01.516W	

### Summary

14. SDU1's exposure to the Borth ranges has yet again proven highly beneficial. The operation continues to provide exceptional training for the Unit in EOR and demolitions whilst the prolonged exposure ensures a significant reduction in the frequency of MACP EOD call outs to the area. The number and combined explosive quantity of ordnance cleared underlines the importance of this continued operation and the impact it has on public safety. In consultation with the Coastguard it is recommended that one clearance operation takes place during the spring term with the second prior to the main summer holiday period. The Range provides highly valuable training in the use of EOR location and identification equipment, together with training in search and demolition techniques. The attendance of ESG personnel and provision of detailed surveys on the ground has been hugely important in identifying targets and increasing efficiency whilst further highlighting the large amount of ordnance that remains to be cleared from the area. As a result SDU1 has deemed ESG attendance as a crucial component for future operations in the area. The operational and training values of this range clearance enhance our professional standing when dealing with reactive EOD tasks and continue to maintain the safety of the public. It is recommended that future operations are to be arranged during spring tides to afford the largest area to be searched.

*Signed on Original*

R Balfour  
Lt RN  
OIC SDU1

Annexes:

- A. Lessons Identified.
- B. Explosive ordnance clearance activity

Distribution:

External:

COSDG\*  
COS to COFDS\*  
WOSDG\*

Internal:

PO(EOD)\*  
Pack

**BORTH RANGE CLEARANCE LESSONS IDENTIFIED**

Serial (a)	Origin (b)	Summary of activity (c)	Lesson Identified (d)	Recommendation (e)	Action (f)
LI 1	PO EOD	Range Clearance	Early contact must be established with Countryside Council of Wales when planning a clearance.	As soon as the Long Cast is written then not long after we should endeavor to make contact especially in the winter months.	OIC, COU
LI 2	PO EOD	Range Clearance	Clear direction must be given to ESG as to what areas to search prior to the OP taking place.	An early planning meeting must take place to ID areas to be surveyed with the survey taking place at Low water.	OIC, COU
LI 3	PO EOD	Range Clearance	Due to the amount of contacts found the amount of explosives taken only just covered the requirement.	An uplift in Explosives is required if ESG find a lot of contacts during there survey.	PO EOD

EXPLOSIVE ORDNANCE CLEARANCE ACTIVITY Task No. FLEET/SDG/EOD/01/12

SER (a)	LOCATION (b)	REMARKS (c)
1	Borth – Inactive historic range	WP 1 - Twyni Bach WP 2 - Cerrigyphenrhyn WP 3 - Traeth Maelgwyn WP 4 - Area 700m North of WP 3

1. Hectares Searched                      Approx 1H2

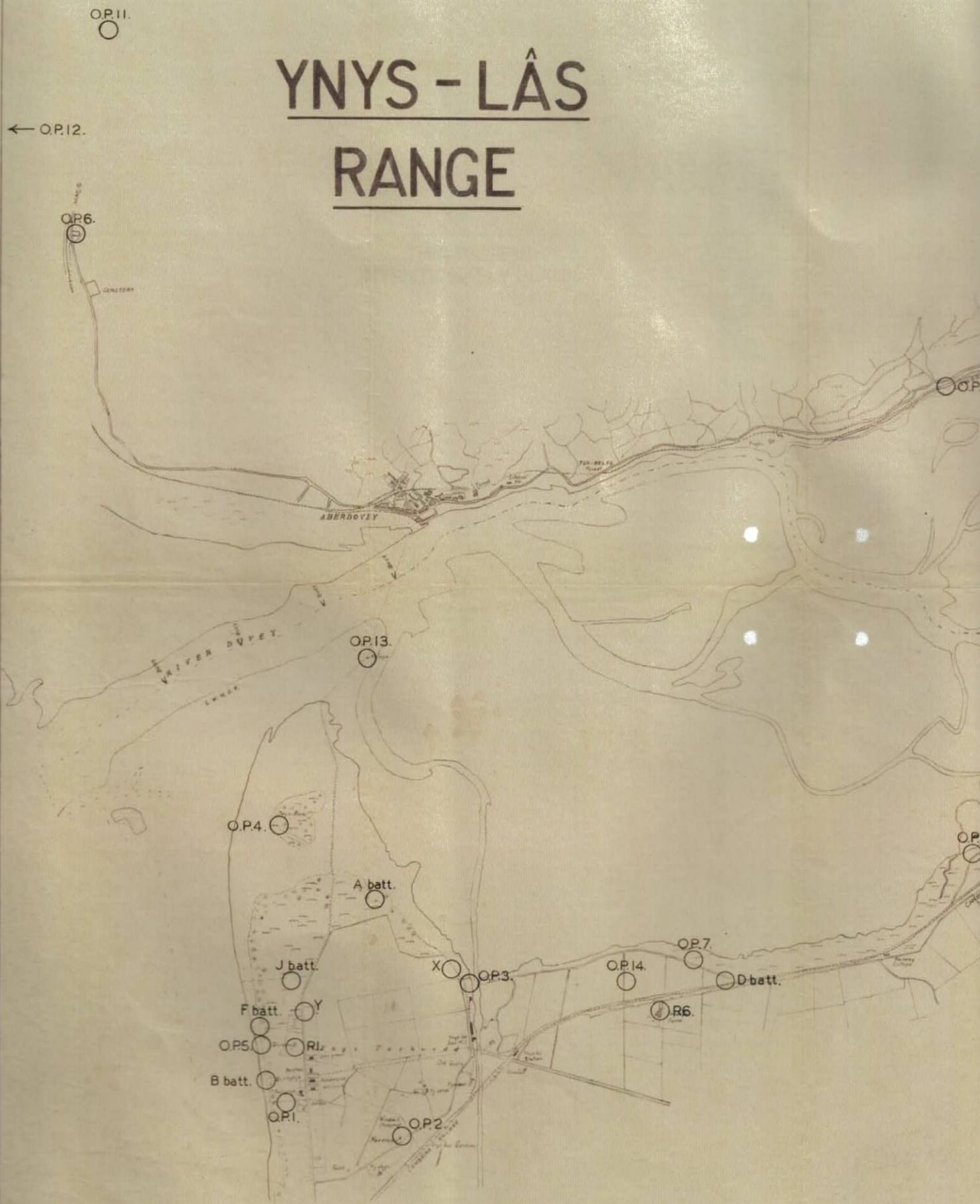
2. Items Recovered

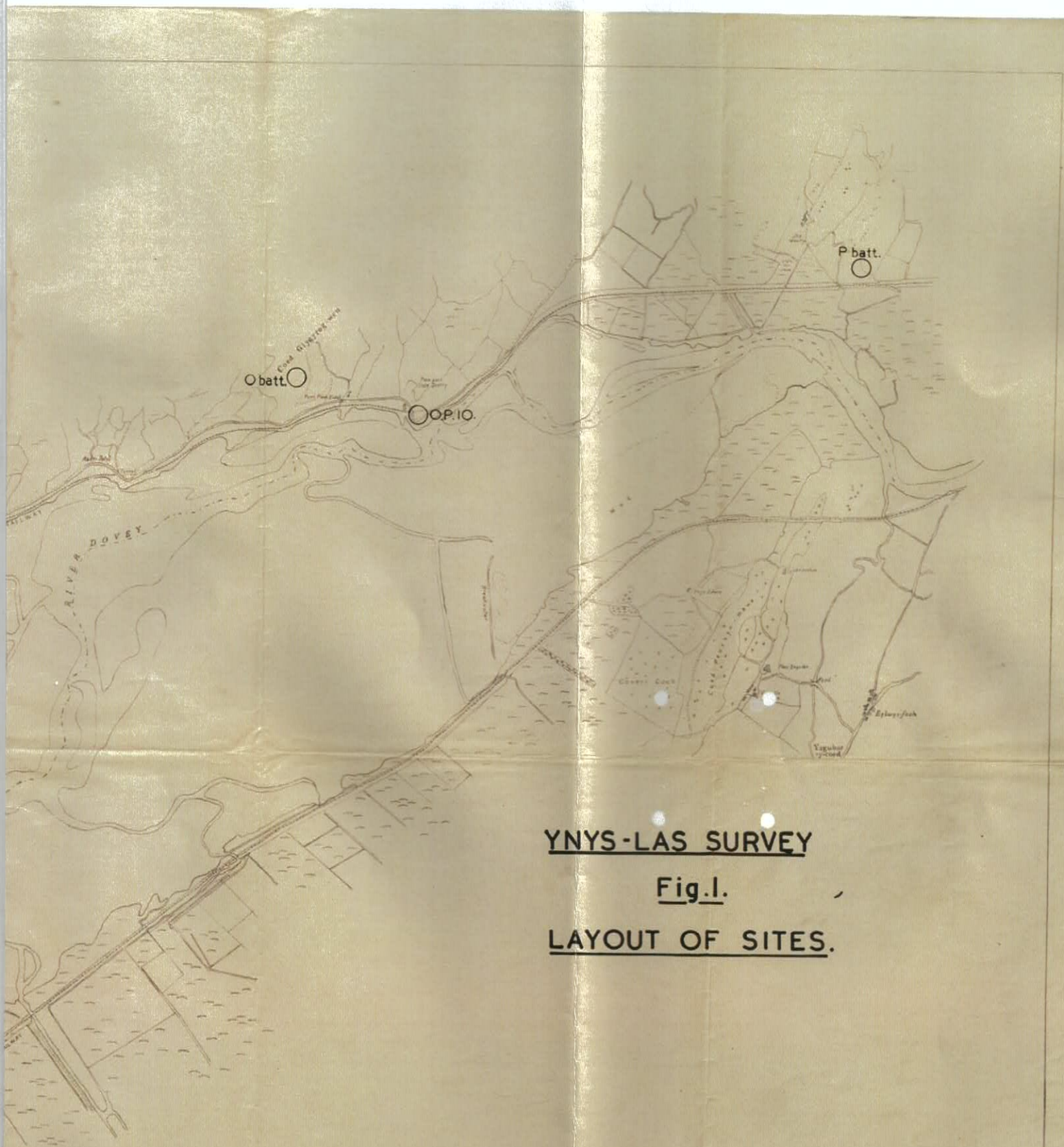
- |                   |                  |      |
|-------------------|------------------|------|
| a. Airdropped:    | (1) Live         | 0    |
|                   | (2) Inert:       | 0    |
| b. LSA            | (1) Live:        | 25   |
|                   | (2) Inert:       | 0    |
| c. SAA            | (1) Live:        | 0    |
|                   | (2) Inert:       | 0    |
| d. Chemical       | (1) Live:        | 0    |
|                   | (2) Inert:       | 0    |
| e. Non – Ex Scrap | (1) Ferrous:     | 75kg |
|                   | (2) Non Ferrous: | 0kg  |

## Appendix C

### 1943 SURVEY PLAN OF THE YNYS-LAS RANGE

# YNYS - LÂS RANGE





YNYS-LAS SURVEY

Fig. 1.

LAYOUT OF SITES.

— SCALE:— 6 INS TO 1 MILE —