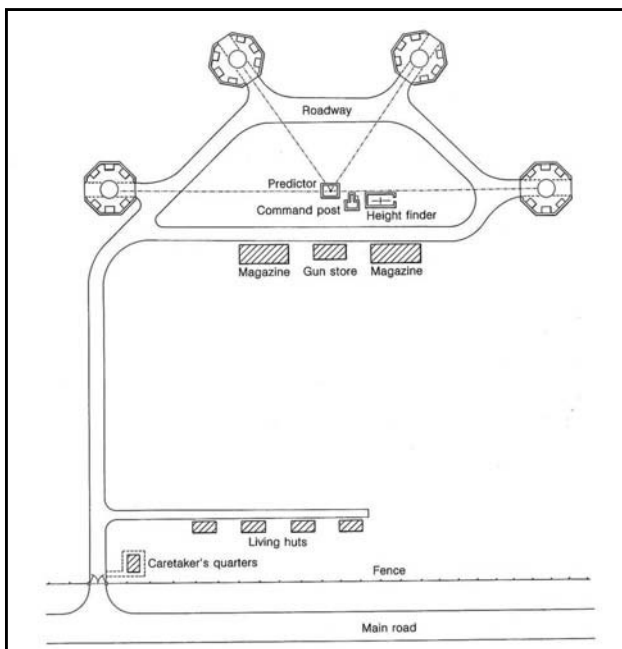




Above: 3 inch gun, 303rd battery, 99th AA Regt. RA Hayes Common in Kent May 1940

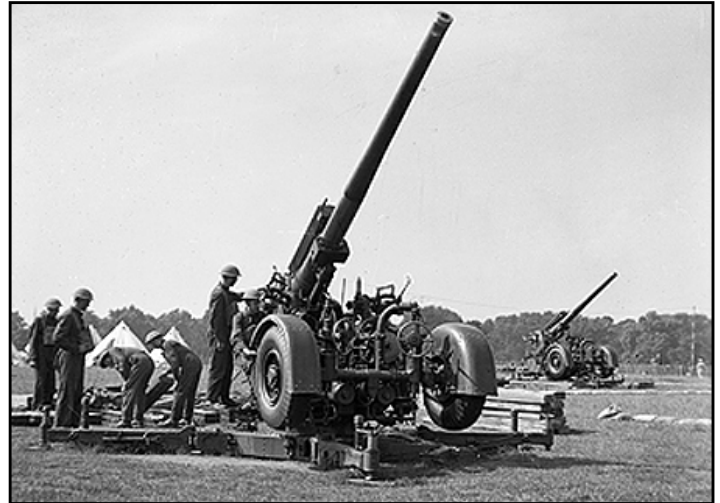


Above: 40mm Bofors gun and crew at Stanmore in Middlesex, 28 June 1940.



Above : Layout plan for a typical HAA battery site.

Below: Hyde Park 1939 3.7 Inch QF gun on mobile mounting



Below: Anti-aircraft rocket or 'Z' Battery manned by the Home Guard on Merseyside, 6 July 1942.



Above: Slade Green's HAA battery, Dartford showing typical size and layout of the installation.

Examples of Recovered AA Shells

4.5 Inch Shell
(Missing fuze)3.7 Inch Shell
(Missing Fuze)

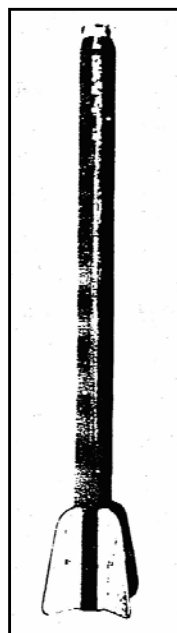
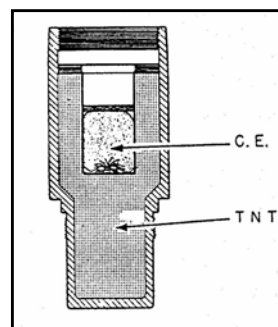
3 Inch Shell

40mm Bofors
Ammunition

Unrotated Projectiles



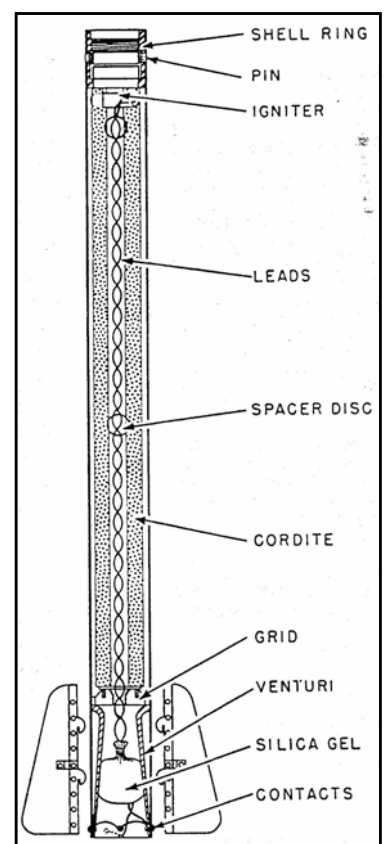
3 Inch U.P. Rocket

2 Inch U.P.
Rocket

MK II HE Shell (3.5kg)

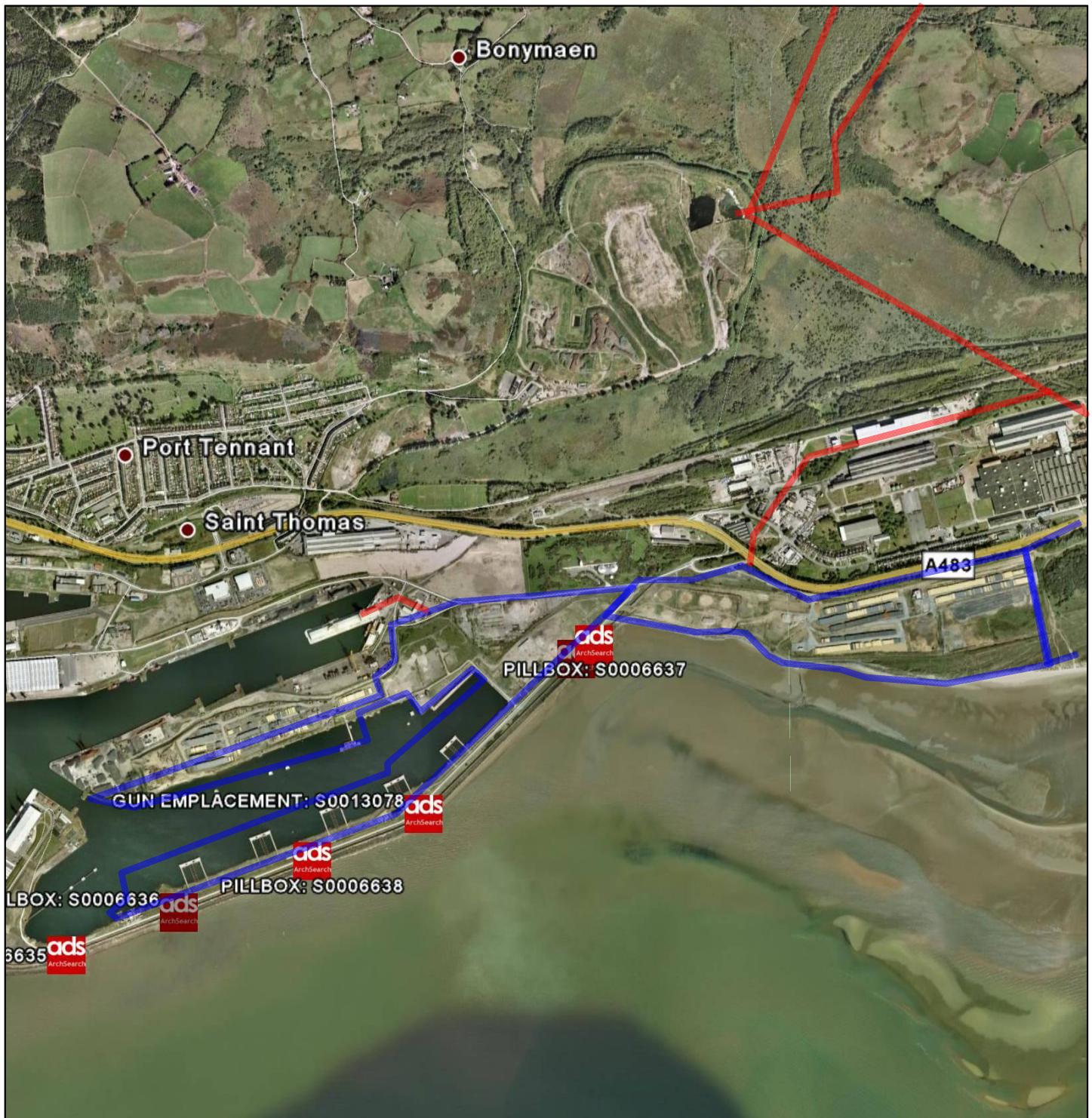


Home Guard soldiers load an anti-aircraft rocket at a 'Z' Battery

Cross sectional Drawing of
2 Inch U.P. AA Rocket

Coed Darcy Urban Village, Swansea
Explosive Ordnance Threat Assessment Report

Annex M: Defensive Positions overlaid onto Recent Aerial Photograph



— Development Area — Pipeline Route



37 Riverside, Sir Thomas
Longley Rd,
Rochester, Kent, ME2 4DP
Tel. +44 (0) 1634 296757
www.bacter.com

Report No:

9741 TA

Client:

Atkins Limited

Project:

Coed Darcy Urban Village, Swansea

Source:

Google Earth™ Mapping Services

Appendix D Drainage Information

Technical Note 672

Subject: EA Discharge consent point W1: Water Quality Survey of off-site sources of nitrate

Reference: 5041216-ENG-TN-000672

Revision: 0

Author: Selina Bamforth

Checker: Ross Goodchild

Issued to: Neil Williams

Reviewer: Richard Engledow

Date: 17/10/11

Authoriser: Mike Poland

1. Introduction

Atkins Limited (Atkins) was commissioned by St. Modwen Developments Ltd (SMD) to undertake a survey of the potential off site source(s) of nitrate that are impacting upon the Environment Agency (EA) discharge consent point (W1). Previous investigations had suggested that there were two key sources of nitrate to the EA discharge consent point; these were the North Site Reservoir (NSR) interception drain and a drain discharging from a railway embankment culvert in Skewen.

This work is required as part of the amendment of the EA discharge consent in line with the discharge of a Planning Condition (PC 33; Neath and Port Talbot Planning Application P/2005/393; Outline Application for an Urban Village).

The survey was carried out over 2 days in September 2011 with representative water samples taken along the NSR drain and from downstream sources around the discharge consent point.

2. Background and Rationale

There are thought to be two key sources of elevated nitrate to the EA discharge consent point; these are the NSR interception drain and drainage discharging from an agricultural drain north of the consent point.

The NSR drain was installed circa 2003 in order to reduce the volume of surface and other waters entering the NSR and hence the costs associated with pumping water from the NSR to the site trade effluent point. It is understood that these works were undertaken following consultation between EAW and the previous site owners BP. The effluent from the drain has been regularly monitored and is noted to be elevated in nitrate (against the proposed discharge limits), which would impact the EA discharge consent point downstream.

The drain, which is constructed as a French drain, was originally designed to collect surface water runoff from the north of the NSR. However, there were thought to be additional inputs to the drain, with evidence suggesting that the drain also picks up water from the M4 drainage and from a surface water drain from Skewen. As built plans which show the connections are not available, therefore a survey was required to fully understand the source of water to the drain.

The source of the agricultural drain that enters Crymlyn Brook upstream of the DC point is currently unknown; however regular monitoring results have demonstrated that this is a recurring source of nitrate to the DC point. Therefore, further investigation was required in this area to investigate this drain and a possible link to the Skewen drainage system.

The object of this work was to clearly demonstrate the source of the nitrate as being from an offsite source rather than from infiltration from the ground north of the NSR.

3. Survey Results

The aim of the survey was to identify the main sources of water to the NSR drain. The weather conditions were dry on the day of the survey, which followed a period of relatively dry weather.

Due to dense vegetation, the whole length of the NSR trench was not inspected; however the connection between the M4 surface water drainage and the interception trench was located and inspected at MH016

(see Drawing 5041216-ENG-DWG-0001046 and Plate 1). The connection is made at the far easterly end of the trench. Cross reference of the M4 drainage plans and the available interception drain plans confirms that this drain collects water from a 450m length of motorway. The motorway drain feed is understood to consist of French drains along both carriageways and along the central reservation. These fall to the west towards the discharge point at MH016.

From the western end of the NSR interception trench, 6 manholes were identified. MH000, which is the final manhole along the interception drain, had a 300mm connection from the north. This is believed to originate from the Skewen estate directly north of the sample point (see Drawing 5041216-ENG-DWG-0001046 and Plate 2). A further 5 manholes were inspected running eastwards along the trench; 3 of these had minor secondary pipes (approx 100mm) entering the manholes from the north. These pipes did not appear to be flowing at the time of inspection.

On the day of the inspection, it was noted that the flow rate from the M4 drainage was roughly equal to that at the end of the trench in MH000, suggesting that there was minimal additional flow entering the trench from surface water infiltration. The flow from the Skewen estate was roughly equal to that from the interception trench (see Plate 2).

Investigation of the agricultural drain which enters Crymlyn Brook at the DC point was also carried out. The drain was traced back to a railway culvert to the north of the DC point, however no further evidence was found up gradient of the culvert. See Plate 3 of the water discharging from the culvert.

4. Water Quality Results

The pertinent lab results, in relation to compliance with the EA discharge consents are presented on Drawing 5041216-ENG-DWG-0001046. The results clearly demonstrate that the M4 drain and the Skewen drain are the key sources of nitrate to the interception drain, with nitrate concentrations remaining constant between the influent and effluent to the NSR drain. It is anticipated that even in wet weather, when there could be some surface water inflow to the drain from ground adjacent to the NSR that the nitrate loading from this source will be statistically insignificant in comparison to the M4 and Skewen drainage.

A water sample taken from the railway culvert was also high in nitrate (Tal y Fedw SW1; 29mg/l) and will also have a significant impact on the discharge consent point. The source of this water to the culvert is currently unknown.

5. Conclusions

These observations and results confirm Atkins opinion that there are three key off site third party sources of nitrate to the site discharge consent point. These are:

- M4 drainage
- NSR Skewen (drain discharging into the NSR drain)
- Railway culvert Skewen (presumed surface water drainage)

Drainage from the site is not considered to impact on discharge consent point W1 with respect to nitrate and therefore any breach of the consent limit at W1 is not SMD's responsibility.



Plate 1. Manhole 016. M4 drainage manhole flow right to left.



Plate 2. Manhole 000. Skewen drainage to the left, NSR drain to the right.

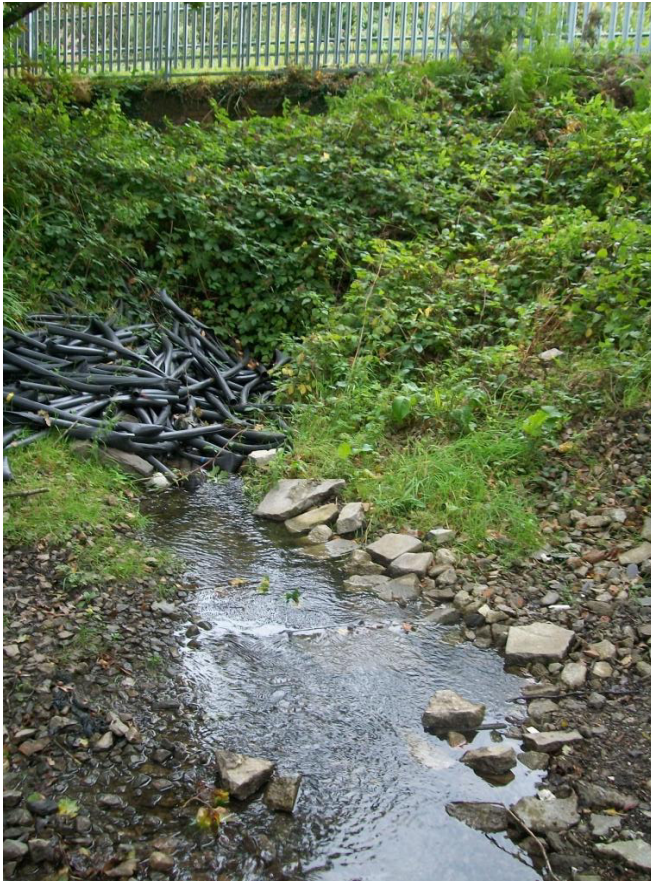


Plate 3. Drain at railway line discharging towards DC point