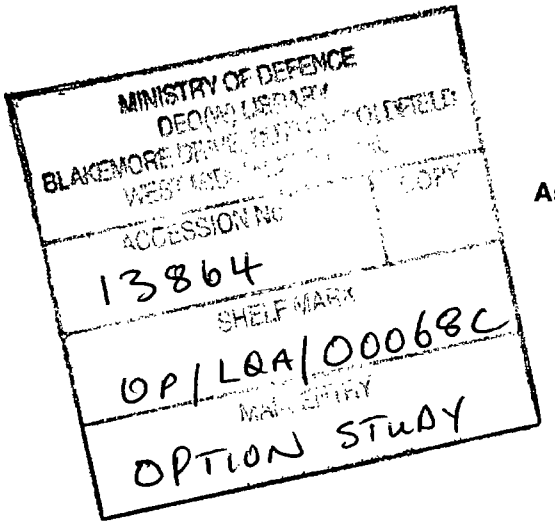
# DEFENCE ESTATE ORGANISATION

# RAF UPPER HEYFORD
# LAND QUALITY ASSESSMENT
# PHASE TWO : INTRUSIVE SURVEY
# LAND QUALITY STATEMENT

## PROJECT NO: 07686- FINAL REPORT




**Technical Report**
**June 1997**
**by**
**Aspinwall & Company Ltd**

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Prepared by Aspinwall & Company Limited
for the Ministry of Defence Estate
Organisation
under Commission WS13/1982/2

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# REPORT RELEASE SHEET

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# Contents

# Land Quality Statement 1

## Introduction

1.1 In March 1997 Aspinwall & Company (Aspinwall) was commissioned by Defence Estate Organisation (DEO) to undertake an intrusive investigation as part of a Land Quality Assessment at RAF Upper Heyford near Bicester in Oxfordshire.

1.2 A Phase I Desk Study was undertaken at the site between August 1996 and March 1997 by ERM EnviroClean. The Desk Study identified a number of possible sources of contamination at the site and recommended a phased intrusive investigation be designed to establish the likely nature, extent and significance of any contamination.

1.3 A proposal for the initial site investigation was submitted by Aspinwall in February 1997. This document explained how, due to the large size of the site (494 hectares), the objective of this first phase of intrusive investigation should not be to undertake a comprehensive investigation across the whole site, but should be to focus on higher risk areas. Following identification of the nature, quantity and extent of contamination in these areas, and establishment of the likely scale of risk, recommendations for undertaking more detailed investigations could be made, if deemed appropriate. Extensive investigation of low risk areas was not thought necessary at this stage.

1.4 This Land Quality Statement provides a non-technical summary of the work which has been undertaken and the resulting assessment of the overall environmental condition of the site and its suitability for redevelopment.

## Site Location

1.5 RAF Upper Heyford, which is centred on National Grid Reference (NGR) SP 515 265, is located some 8 km to the north west of Bicester, Oxfordshire. The village of Upper Heyford lies immediately to the west with Somerton to the north west, Fritwell to the north north east, Ardley to the east north east and Middleton Stoney to the south south east. Junction 10 of the M40 is some 3 km to the east of the centre of the airfield. The site is located on a plateau at about 130m Above Ordnance Datum (AOD), although at its western end its elevation reduces to 115m AOD associated with the valley of the River Cherwell. The latter, which flows alongside the Oxford Canal, is located about 1 km to the west of the site at an elevation of about 80m AOD. The land surrounding the site is dominantly in agricultural usage, either for crops or grazing. At the time of the investigation the crops were dominated by wheat and rape. A site location plan is shown in Figure 1.

## Site Description

1.6 RAF Upper Heyford occupies an area of 494 hectares comprising an airfield and taxiways, hardened aircraft shelters, maintenance areas, offices and a residential and recreational area. Use of the site is controlled by the North Oxfordshire Consortium (NOC). They have leased extensive sections of the main runway and taxiways to two companies, Walon and Keddy, both of whom use the areas to store cars. Other taxiways are used by Thames Valley Police for skid training, whilst much of the grassed area on the northern side of the main runway is used for grazing. A number of buildings have been leased for a range of other purposes including storage, crane maintenance and office space. A number of additional uses are also being considered.

1.7 For consistency the site has been divided into the same five areas, A to E, as used in the Phase 1 report as indicated on Figure 2. A petrol, oil and lubricant (POL) supply ring main passes beneath all five areas, although only a short section passes beneath area E. Areas A to D all include part of the west south west / east north east orientated runway, associated taxiways and hardened aircraft shelters. The remainder of the areas comprise the following:

*Area A* is dominated by family housing, offices, maintenance and workshop areas and a former petrol filling station. There are six POL storage areas and a large number of other above ground and under ground storage tanks within Area A. A small part of area A was also used for fire practice purposes.

*Area B* is dominated by taxiways and aircraft shelters and includes 5 POL storage areas in addition to a small number of above ground storage tanks.

*Area C* is dominated by taxiways a small number of aircraft shelters/maintenance facilities, in addition to a former weapon storage area, part of which is now used for storage of fireworks. There are 4 small POL storage areas and a small number of storage tanks. A watercourse is formed off-site in the vicinity of the weapons storage area by outflow from a pipe draining from beneath the site.

*Area D* includes a small number of hardened aircraft shelters/maintenance facilities in addition to a second extensive weapon storage area. There are three POL storage areas in addition to two other bulk fuel storage locations. Only one underground storage tank was identified by the Phase One study as being present in area D. Two watercourses are discharged to from pipes on site which pass through a surface oil interceptor.

*Area E* is dominated by residential and recreational facilities, in addition to a small number of offices. There are a small number of storage tanks and a former petrol filling station. There is also a sewage farm within area E, but outwith the site. Following a review of the Phase One study this was classed as a low potential contamination risk and so did not form part of the intrusive investigations. On the southern side of Area E two watercourse are fed by discharges from site one of which passes through a surface oil interceptor, the second, a storm water drain, discharges directly off site.

# Land Quality Statement *continued* 1

Much of the areas A and E are covered by hardstanding (tarmac and concrete) although there are extensive grassed areas adjacent to the runway and taxiways and smaller grassed areas between buildings. Excepting runways and taxiways and buildings much of the remaining site is grass covered.

## Site History

1.8 Prior to construction of an airfield in 1916 and its occupation by the Canadian airforce the area around and including the site was primarily farm land. In 1951 control of the base passed to the United States Air Force (USAF) at which time many new buildings were erected and the runway lengthened. With the arrival of F-111 bombers in 1970 further modifications were carried out including construction of the hardened aircraft shelters. The base closed in 1994. It is now under the control of NOC.

## Site Sensitivity

1.9 The site is considered to be in an area of high sensitivity with respect to both surface and groundwater. The majority of the site is underlain by a major aquifer, the Great Oolite which is used extensively for local water supply, and which supports flow in surface water courses via numerous springs. Several of these springs are thought to rise from beneath the base, and are also fed by storm water discharges from site. The spring fed surface water courses are generally of fair to good quality.

## Sources of Relevant Information

1.10 The information used in this assessment of land quality includes:

- the Desk Study prepared by ERM Enviroclean which provides a description of historical activities at the site and details potential sources of contamination;
- information relating to the environmental setting of the site gathered from published maps and other documents, and from regulatory authorities;
- an intrusive investigation undertaken as part of this study which involved an extensive soil vapour survey, the excavation of trial pits at 141 locations and the installation of 9 monitoring boreholes at 7 locations; and,

- chemical and radiochemical analysis of soil and groundwater samples collected during the investigation.

1.11 The aim of the intrusive investigation undertaken to date has been to concentrate on high risk areas of the site. There remains a possibility, that other localised areas of contamination exist in areas of the site not directly covered by this site investigation.

## Ground Conditions

1.12 The depth of trial pits excavated during the course of the Phase Two investigation were limited by the presence of weathered bedrock. The material overlying this was dominated by a layer, or layers of silt or clay, often sandy, and comprising a significant proportion of gravel to cobble sized pieces of limestone. The average depth to bedrock was 1.5m (standard deviation 0.4m) with a range from a minimum of 0.8 to a maximum of 3.0m. There was little difference in the depth to bedrock in each area investigated. In 60 trial pits material was encountered which could clearly be described as fill (made ground). In many instances overlying material appeared to be natural, suggesting that at a number of locations the natural material may have been excavated and then replaced following completion of whatever work was required. The fill material encountered generally comprised small amounts of ash or clinker. Brick, concrete, tarmac, wood and metal were also found, although excepting, a small number of trial pits, this material was generally limited in thickness.

1.13 At the locations drilled, the unconsolidated material was underlain by limestone strata, of between 4.1 and 21.3 m thick with occasional clay, mudstone and sand/sandstone bands, overlying a thick mudstone sequence with occasional limestone and sandstone bands. Groundwater is present within a number of horizons depending upon the lithology present, but is generally within bedrock rather than drift material. It is present at depths of between 1 and 35 m below ground level.

## Sources of Identified Contamination

1.14 The majority of the soil samples analysed were uncontaminated, however, limited contamination was detected in samples from the following areas:

- former fire practice area where elevated concentrations of petroleum hydrocarbons have been detected in soils taken from trial pits 142 and 149;

- the weapons storage area adjacent to trial pit 124 where hydrocarbon contamination has been identified; and,

- significant contamination by phytotoxic metals is limited to the area around TP113 & TP113A where copper and zinc are elevated.

In addition, hydrocarbon contamination, albeit at relatively low concentrations, was identified in POL 20 (trial pit 93) and POL 21 (trial pits 14 and 16).

1.15 The sources of identified contamination are illustrated on Figure 3. It should be emphasised that the extent of the areas contaminated by the compounds listed above is likely to be localised and is not likely to be extensive.

## Assessment of Risks from Identified Hazards

1.16 A risk assessment of the hazards which have been identified at the site has been undertaken in order to estimate the potential risks to sensitive receptors. The receptor may be human health, a water resource, a sensitive local ecosystem or even future construction materials. Receptors can be connected with the hazard via one or several exposure pathways. Without the three essential components of a hazard, pathway and receptor, there can be no risk. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

1.17 The hazards identified at RAF Upper Heyford have been identified for a number of different site conditions from current status to during redevelopment or remedial works, to after redevelopment. The risks have been assessed for a number of redevelopment options including gardens, parkland, residential and industrial use. The risk to human health from chemical contamination is considered to be low or very low under present site conditions and during the course of any work proposed for redevelopment. The risk to surface waters and the underlying aquifer from the isolated occurrences of hydrocarbon contamination at the site is considered to be low. However, the risk would increase during any physical works undertaken during redevelopment of the site such as excavation for building foundations and service trenches etc. Where excavations as part of redevelopment do take place then provided suitable control measures are employed the potential contamination risks can be minimised.

1.18 Although the asbestos materials used in buildings throughout the site are generally intact and in good condition there are isolated areas with damaged sections of asbestos cement sheet present (e.g. adjacent to TP133). In such areas there is a high risk to health if the period of exposure is significant, but elsewhere the risk is low. Even in areas where asbestos containing materials are in good condition damage and dust generation will undoubtedly occur in the event of demolition. In order to limit risks associated with redevelopment all demolition works on buildings containing asbestos will have to be carried out under carefully controlled conditions by specialist contractors appropriately licensed for asbestos removal with particular attention to dust suppression and the health and safety of site workers.

# Land Quality Statement *continued* 1

## Overall Land Quality

1.19 On the basis of the intrusive work undertaken as part of this phase of the Land Quality Assessment, and the enquiries and information researched as part of Phase One, it is considered that the majority of the site at RAF Upper Heyford is free from significant contamination. Slight hydrocarbon contamination exists in the former fire practice area and adjacent to trial pit 124 in the former weapons storage area. Other isolated hot spots of hydrocarbon contamination exist in a limited number of locations on the site, although the extent of the contamination in these areas is likely to be limited to the immediate vicinity of the source. There remains a low risk that other localised areas of contamination may exist in areas not directly covered by this investigation.

## Suitability for Redevelopment

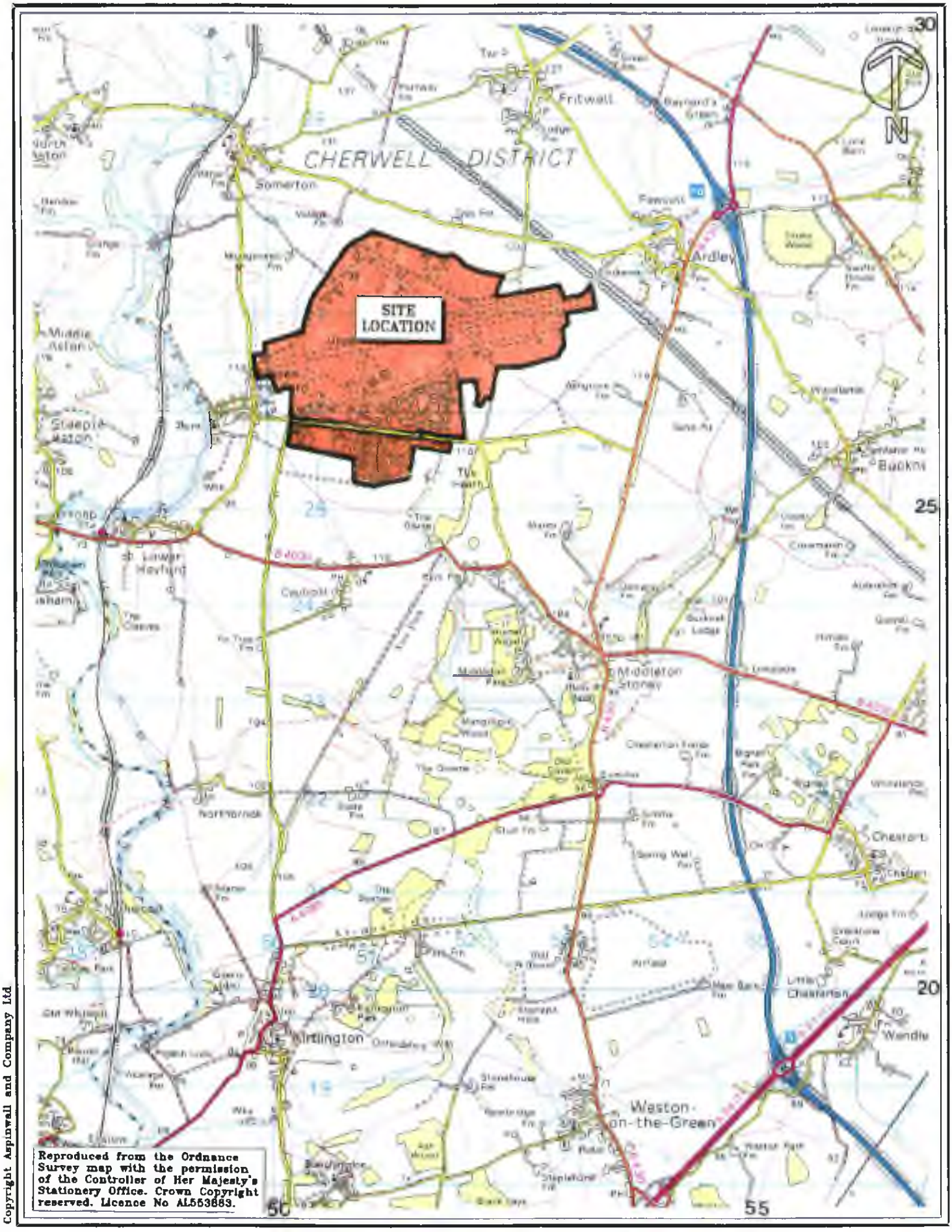
1.20 In its current state, and provided that the site remains undisturbed (ie. excavations for building foundations and service trenches etc are not undertaken), the hazards identified pose minimal risk to human health or the environment. Samples obtained from the ground investigation, which was targeted to assess areas at high potential risk from contamination, combined with groundwater samples and background information (including the Phase One report) suggests that the site is largely uncontaminated and therefore suitable for redevelopment for either housing or commercial / industrial use without the need for extensive remediation. Excavation and removal of any hydrocarbon contaminated soil in the vicinity of the former fire practice area/former weapons storage area will be required before redevelopment occurs in this part of the site, and some remedial measures may be required to deal with localised hot spots of contaminants in other affected areas (see Figure 3) if they are to used for the locating of service runs or building footprints.

1.21 If a more sensitive end-use than for industrial purposes is proposed, then levels of phytotoxic metals and organic compounds will need to be considered during the locating of any areas of landscaping or gardens or during the laying of services. Certain areas of the site would require a minimal amount of remedial work including removal and disposal at a licensed landfill of fill materials and removal of hydrocarbon contaminated soils identified by this study. The presence of asbestos-containing materials in the buildings on the site must be taken into consideration during any demolition activity and should be removed by a licensed contractor according to the relevant Health & Safety Executive Guidance.

# Figures

# Figure 1

## Site Location





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DATE JUNE 1997

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DRAWING
# FIGURE 1
## SITE LOCATION

# Figure 2

## Site Plan

LOOSE MINUTE

D/DEO/27/104/4/07686

[redacted]
Librarian

Date 23 October, 1997

**RAF UPPER HEYFORD: Land Quality Assessment (Project No. 07686)**

1. I enclose one copy of the Phase One Land Quality Assessment for RAF Upper Heyford. The reports comprise four volumes: Factual Report, Factual Report Appendices, Interpretive Report and Land Quality Statement.

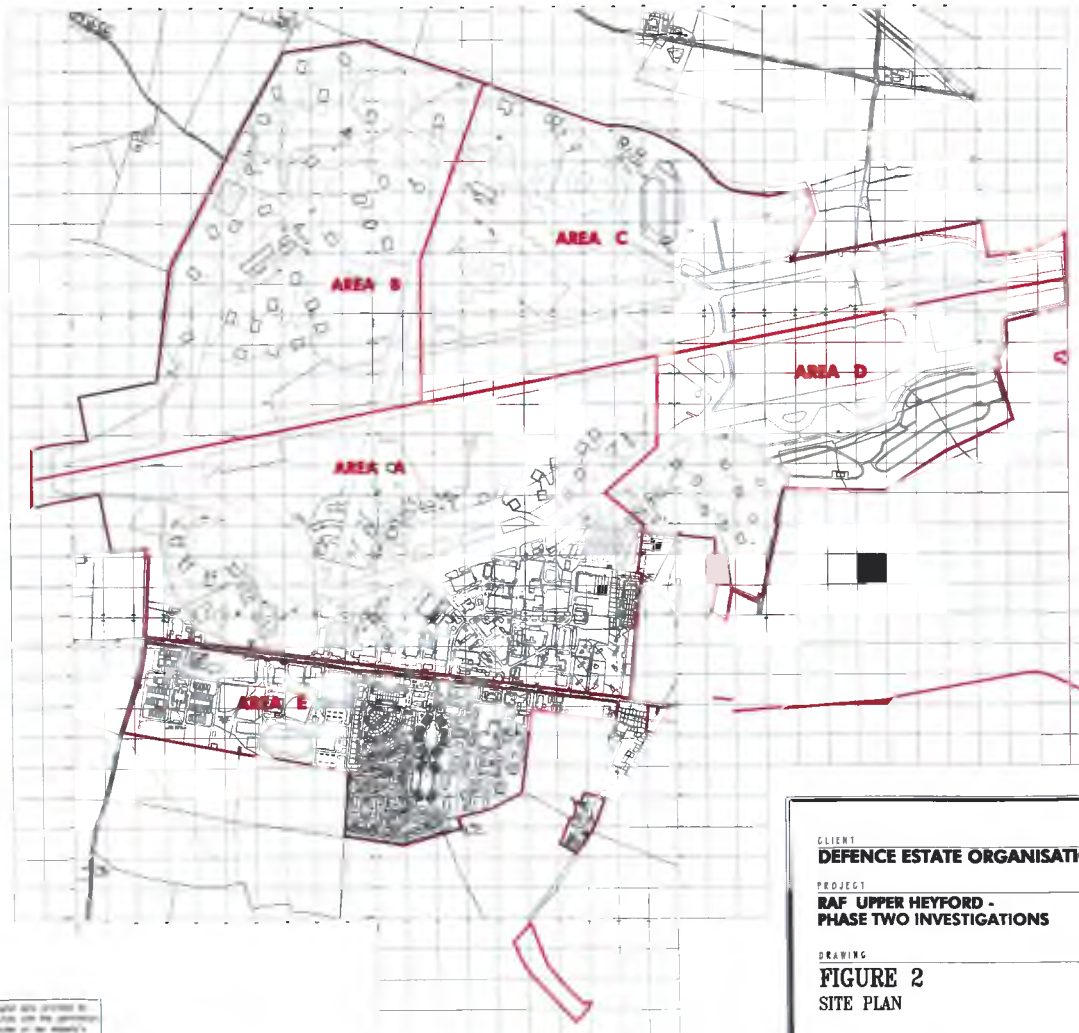
2. Please archive them under 'Land Quality Assessment'. They should also be archived under the following key words

   contaminated land
   risk assessment

3. Please contact me if I can be of further assistance.

[redacted]

[redacted]
Environmental Engineer
SCG 5e, DEO HQ




KEY

Site Boundary

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FIGURE 2
SITE PLAN

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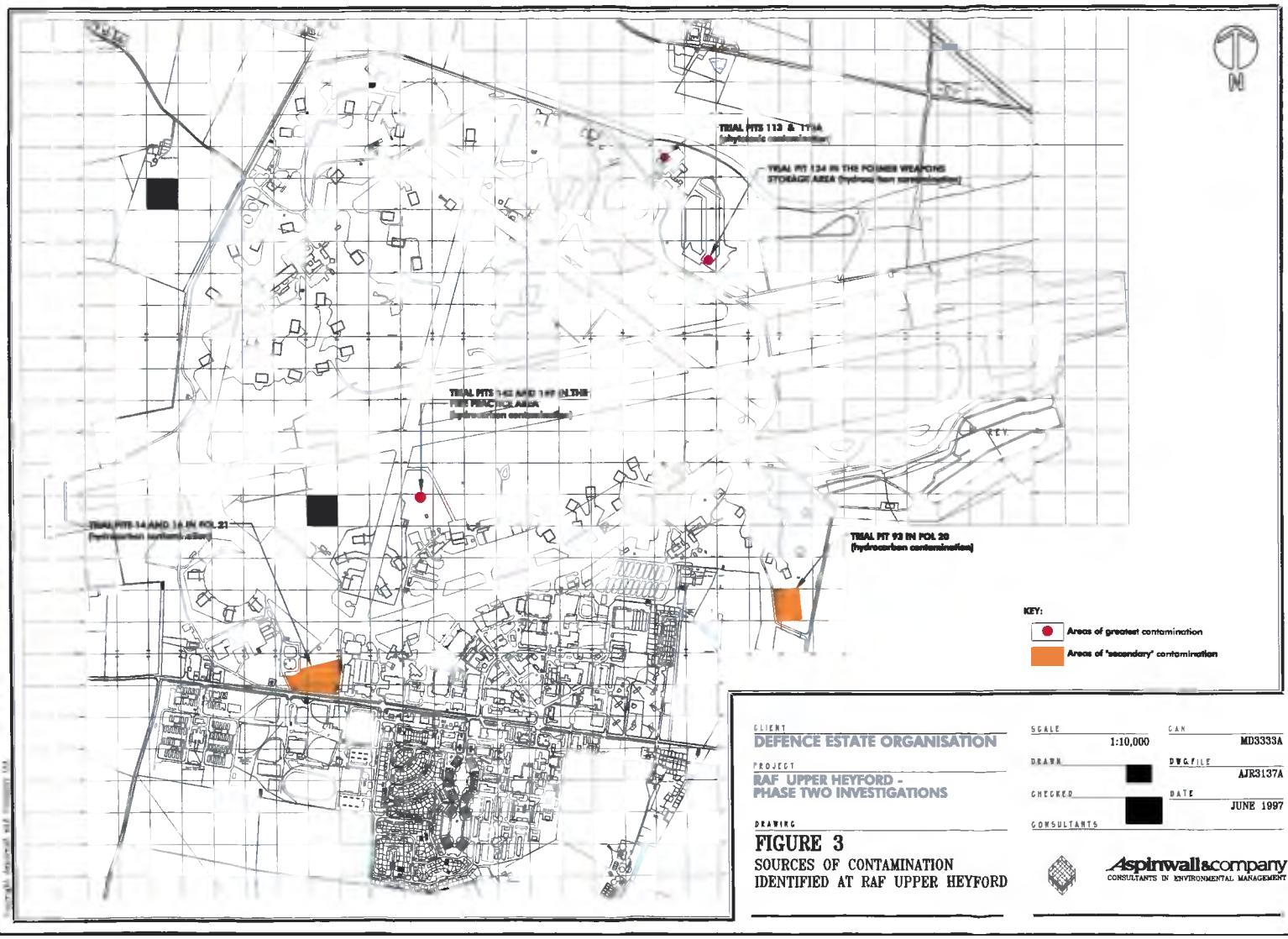
# Figure 3

## Sources of Contamination

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DRAWING
# FIGURE 3
SOURCES OF CONTAMINATION IDENTIFIED AT RAF UPPER HEYFORD

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