

**BAE SAMLESBURY  
BAE TRAINING FACILITY**

**SITE REVIEW**

**REPORT 6715  
REVISION S1**

**Prepared for  
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## **Duty of Care**

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## **Introduction**

This report has been based on consultation and desk study research of information generally accessible in the public domain.

A general review of the proposed development site has been undertaken by TRP Consulting based on the following sources:

- Envirocheck data, Geology Report and historical mapping supplied under ref. 29511755\_1\_1, dated December 2009
- BAE Samlesbury 430 Building Extension Geo-Environmental Interpretive Report, prepared by Atkins for BAE Systems Samlesbury, September 2009 (document reference 5078304.406.32711)
- BAE Systems Samlesbury Geotechnical Factual Report, prepared by BAE Environmental, September 2009 (document reference A0942-00-R3-1)
- BAE Samlesbury Building 610 Development Site Phase 1: Geo- Environmental Site Appraisal Desktop Study Volume 1 Revision S2, prepared by TRP Consulting for BAE Systems Limited, September 2008
- Ground Investigation at 610 Building BAE Systems Samlesbury, Report No. 5071, prepared by Sub Surface North West Limited for BAE Systems, dated July 2008
- Geo-Environmental Investigation and Assessment for Phase 1 Development Area Building 608, prepared by Capita Symonds Structures for BAE Systems Limited, August 2006 (document reference SS/015732/GEIA/August 2006)
- Ground Investigation at 4 Shed, BAE Samlesbury, Lancashire for BAE Systems Environmental, Report no. 3843, prepared by Sub Surface North West Limited, March 2002
- Ground Investigation at 4 Shed Extension BAE Systems, Samlesbury Aerodrome, Lancashire, Report No. 3578, prepared by Sub Surface North West Limited for BAE Systems (Operations), November 2000
- Ground Investigation at Enterprise Zone, Training Facility, BAE Samlesbury, Report No. 5887A, prepared by Sub Surface North West Ltd. dated November 2014

The findings of this report are based on finite information obtained from research and consultations. TRP Consulting cannot guarantee the reliability of all such information and the searches should not be considered exhaustive. The findings of the report may need to be reviewed as any future exploratory investigations progress and in the event that additional archive information becomes available.

## **The Site**

The Training Facility is to be constructed on part of the BAE Systems site at Samlesbury. The Samlesbury site was formerly a World War 2 airfield which was subsequently developed for aircraft component manufacture and assembly. The site was undeveloped open farmland prior to the war as confirmed by reference to historic Ordnance Survey mapping.

Reference to the Ordnance Survey mapping of 1939 indicates that the site of the proposed training facility sits across the line of the former Myerscough Smithy Road, the A59, which generally coincides with the current day Local Authority boundary. There were possibly drainage ditches associated with the road picking up field drains from farmland to the south. The land drainage network was reconfigured and watercourses culverted as part of the airfield construction post 1939.

The mapping of 1939 also indicates a pond on the western boundary of the development site and several ponds in the surrounding area. The on-site pond was infilled as part of the airfield construction.

The site is currently an open grassed area gently sloping from approximately 83.5m AOD on the Eastern boundary to 79.3m in the North West corner.

There are a number of existing services which cross the proposed development site, some of which are to be retained in their current location and others are to be diverted.

## **Proposed Development**

The building is to accommodate a range of functions including workshops, office and teaching facilities and general circulation and atrium areas.

The workshop/teaching area will incorporate a number of separate functions/zones:

- Aircraft Hangar Area
- Milling, Turning & Grinding
- Fitting Area
- Fabrication & Welding Workshop
- Riveting Booth
- Carbon Clean & Dirty Room

## **Geology**

British Geological Survey Sheet 75 indicates the site to be overlain by glacial boulder clay typically comprising sandy silty clays with some gravel, cobbles and occasional bands or pockets of sand. The underlying solid strata comprise bedrock of Carboniferous Millstone Grit at depths in excess of 15 metres.

### *Previous Site Investigations*

Historic ground investigations undertaken in connection with previous projects on the Samlesbury site have been reviewed to determine the likely ground conditions across the development site. These investigations include the following:

- BAE Samlesbury 430 Building Extension Geo-Environmental Interpretive Report, prepared by Atkins for BAE Systems Samlesbury, September 2009 (document reference 5078304.406.32711)
- BAE Systems Samlesbury Geotechnical Factual Report, prepared by BAE Environmental, September 2009 (document reference A0942-00-R3-1)
- BAE Samlesbury Building 610 Development Site Phase 1: Geo- Environmental Site Appraisal Desktop Study Volume 1 Revision S2, prepared by TRP Consulting for BAE Systems Limited, September 2008
- Ground Investigation at 610 Building BAE Systems Samlesbury, Report No. 5071, prepared by Sub Surface North West Limited for BAE Systems, dated July 2008
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Based on previous investigations it was anticipated that the general succession of strata across the development site would comprise topsoil overlying firm to stiff clay at shallow depth. Some areas of made ground may be present, possibly extending to depths of up to 1-1.5 metres, associated with levelling of the site as part of the wartime airfield construction.

With reference to the site of the proposed training centre, the 1939 Ordnance Survey mapping indicates the presence of a former pond in the north west corner of the development site. The pond was presumably backfilled at the time the wartime runway was constructed. The presence of deep fill and buried organic matter can give rise the generation of land fill gas, methane and carbon dioxide which in turn give rise to the potential for explosion or asphyxiation if allowed to accumulate in confined spaces.

The former use of the site as an airfield and manufacturing plant could give rise to the presence of potentially contaminated materials at shallow depth. Contaminants could include hydrocarbons, aviation fuels, heavy metals and discarded munitions.

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A risk assessment has previously been undertaken to assess the potential for the presence of unexploded ordnance dating back to wartime use. The site has been classified as low risk in terms of unexploded ordnance.

### **Hydrology and Hydrogeology**

The glacial till is classified as a non-aquifer and the underlying Millstone Grit as a secondary aquifer. The site does not lie in a groundwater protection zone and there are no licensed abstractions within 1km of the site.

The closest surface water feature, a pond, is located around 100m south of the site. Mellor Brook is located around 206m north east of the site.

### **Flooding**

Environment Agency Flood Mapping indicates that the site is located within EA Flood Zone 1. EA Flood Zone 1 land has been assessed as having a minimal 0.1% (1 in 1000 year) chance of flooding from rivers or the sea in any given year.

### **Ground Investigation**

A ground investigation was undertaken on the site in July 2014 by Sub Surface North West Ltd. The investigation comprised 6Nr shell and auger boreholes and 6Nr machine dug trial pits together with insitu sampling and laboratory testing. The investigation was designed to provide the following information:

- The succession of superficial strata across the site and in particular the depth of topsoil and fills and the consistency of the underlying glacial till.
- Classification of superficial strata to confirm geotechnical parameters and criteria for design of pad or piled foundations and ground floor slabs.
- Chemical testing of superficial strata to identify potential contamination and to classify materials in respect of CLEA thresholds for commercial use and Waste Acceptance Criteria (WAC) for disposal of materials to landfill.
- Criteria for design of infiltration drainage systems
- Borehole monitoring to confirm concentrations and flow rates of any ground gases present which might pose a hazard to the development.
- Targeted investigation of the former backfilled ponds to confirm location, depth and nature of backfill.
- Targeted investigation of the former road and associated drainage features to confirm location, depth and nature of backfill.
- CBR testing of superficial strata to confirm design criteria for road and car park pavements.

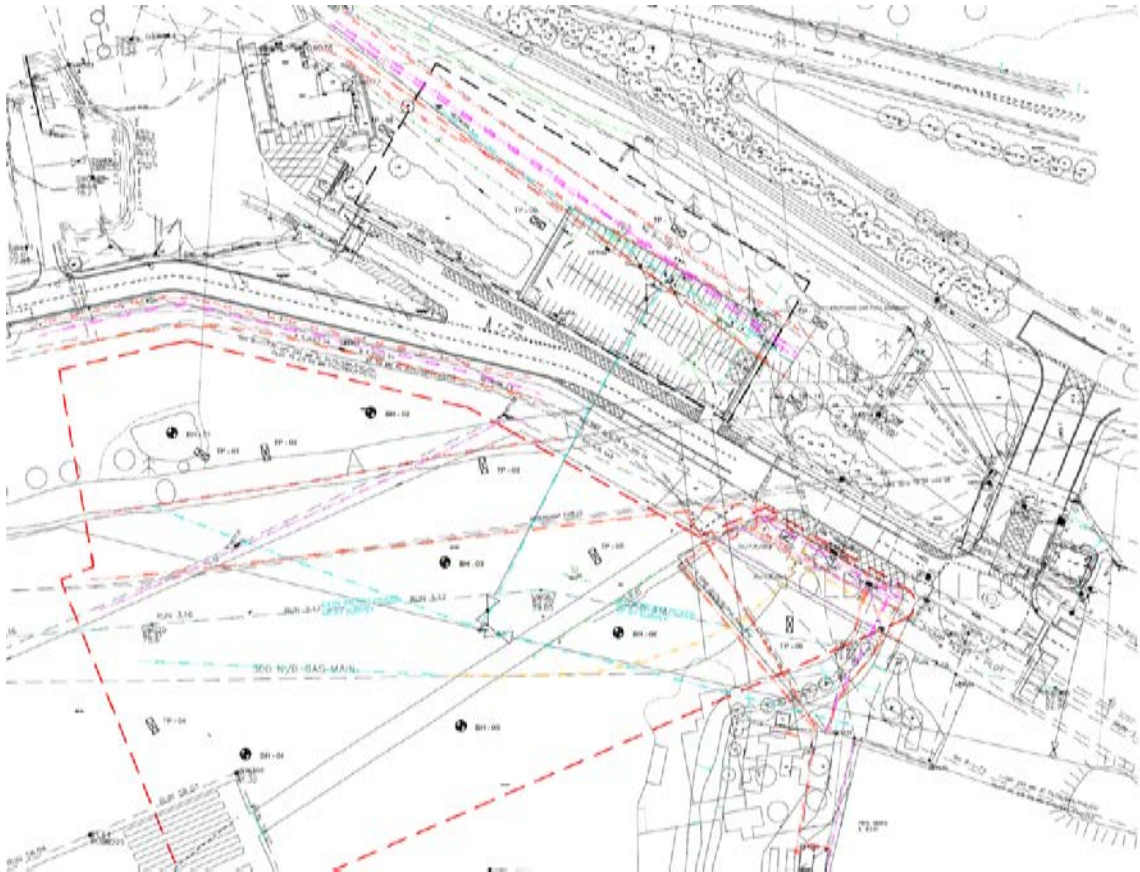


Figure 1: Trial pit and borehole location plan

The boreholes and trial pits confirmed the general succession of superficial strata to comprise turf and topsoil to depths of 0.3-0.4m overlying firm and firm to stiff boulder clay. Deeper areas of fill were encountered as expected in the area of the former pond. The pond is located in the northern western area of the site which is proposed to be car parks and is remote from the building footprint.

Contamination testing undertaken from samples across the site identified no elevated levels of contamination when related to the threshold values for commercial use. It is possible however that local contamination hotspots may exist between sampling points, although the risk is considered to be low.

Ground conditions in the vicinity of the proposed training centre building footprint are represented by the findings from boreholes BH3, BH4, BH5 and trial pits TP4 and TP5. Ground conditions in this area comprise 200-300mm of topsoil overlying firm and stiff brown silty gravelly clay.

The Site Management Plan proposes that any surplus materials will be retained on-site and reused as part of the general landscaping and mounding strategy.

Ground gas monitoring undertaken in boreholes on the site identified levels of methane of up to 1.3% and carbon dioxide of up to 6.5% by volume. No significant gas flow rates were

recorded. This, in effect, means that low levels of gas are present in the superficial fill material but there is no significant gas generation.

Reference to BS 8485 indicates that based on the gas concentrations and flow rates the site would fall within Characteristic Gas Situation<sup>1</sup>, CS1 for which no special gas protection measures are required. The recoding of a carbon dioxide reading in excess of 5% however, regardless of the gas flow rate, would increase the Characteristic Situation to CS2. This would require gas protection in the form of a reinforced concrete ground bearing foundation raft slab with limited service penetrations in conjunction with a taped and sealed membrane to reasonable levels of workmanship. A normal well-constructed concrete ground floor slab on a 2000 gauge polythene membrane is close to achieving this level of protection.

Based on a review of the gas monitoring results however, it is apparent that the only borehole in which carbon dioxide levels exceed the 5% threshold was BH1 which is located within the footprint of the former pond. The pond location is remote from the proposed building footprint and the organic matter which provides the source of the gas will be removed as part of future car park construction. It is therefore considered that Characteristic Situation CS1 is more appropriate to the design of the phase 1 development.