Suffolk County Council

BUILDING RECORDING REPORT

SCCAS REPORT No. 2011/040

Building 538, RAF Mildenhall
MNL 641

R. Brooks

www.suffolkcc.gov.uk/e-and-t/archaeology

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HER Information

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Curatorial Officer:	**Jude Plouviez**
Project Officer:	**Rob Brooks**
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Contents

List of Figures

List of Appendices

1. Selected photographs

Summary

A Level 2 building recording survey was carried out on Building 538, a Type ‘C’ Hangar at RAF Mildenhall, Suffolk, prior to its demolition. It was almost entirely brick built, based around a metal girder framework. At each end of the building were two sets of three sliding doors to allow access to aircraft. Flanking both long sides of the structure were the original annex buildings. The building was constructed in 1934 and was used for aircraft storage before and during World War II, as well as throughout the Cold War, when the Lockheed SR-71 Blackbird was intermittently kept there from 1974. More generally the hangar was used for storage, offices and workshops. Much of the internal structure had been altered to suit the changing requirements of its use, although many of the original doorways and larger doorways, (presumably for vehicle or machinery access), were still visible. A memorial to a mascot bulldog (named Bill Prune) for No. 15 Squadron from 1943 was located just south of the building.

1. Introduction

A building survey to record a 1934 Type-C aircraft hangar was undertaken ahead of its demolition on RAF Mildenhall, Mildenhall, Suffolk (Fig. 1). The work was a condition on the consent for the construction works and was based around a Brief prepared by Jude Plouviez (Suffolk County Council Archaeology Service, Conservation Team). The work was carried out on the 16th and 23rd December 2010 and was funded by MoD Defence Estates USF to fulfil a condition on having the building demolished.

2. The recording

2.1 Site location and land use

The building was located at grid reference TL 682 771, near the western end of the runway on its northern edge. The building was still in use for equipment storage prior to the survey by various groups, including the US air force and the navy. It had several modern breeze block structures within it associated with this function. The rooms flanking the main structure were in use as offices prior to the survey. A line of trees flanked the northern edge of the hangar.

2.2 Historical background

The land for Mildenhall airbase was purchased in 1929, with the first buildings constructed by 1931, and the base officially opening on October 16th, 1934. On October 20th, the base held the England-to-Australia air race. Soon after this it received the 99B Squadron, including Handley Page Heyford bombers. Throughout World War II the base remained very active and it was at this point that the concrete runways were installed. In the late 1940s the RAF reduced its activity on the base whilst the US Air Force began to take over base operations more extensively (USAF, 2009). Building 538 was constructed in the first phase of RAF expansion of 1934 and designed by the Air Ministry's first architect, A Bulloch (Francis, pers. comm.). It was used for aircraft storage, offices and maintenance. The internal structure of Building 538 was heavily altered and augmented after its initial design. Although the overall shape remained the same, several internal fences and structures were added and doorways were removed and added as required. Also, within the annexes many of the walls were covered or obscured by new fittings, making the analysis of some structural components difficult.

During the Cold War the hangar was still in use for aircraft and in April 1971 it was modified in order to be suitable to house the Lockheed SR-71 Blackbird reconnaissance

aircraft (Crickmore, 2004). The aircraft was finally stationed at RAF Mildenhall from April 1976 (Haynes, 2004).

As of 2001, approximately 200 Type-C hangars were thought to still be in use on MoD Estates in the UK. The first phase of construction, of which Building 538 is a part, commenced in 1934, with a gabled roof design, whilst later Type-Cs were built from 1938 with hipped-shape rafters. They evolved from the Type-A and B hangars built in the 1920s. The design was continued until the early 1940s, when faster, and therefore by necessity lighter, construction types superseded the Type-C. In general, many operational Type-C hangars are still used for motor transport, garaging and workshops, and the storage of equipment and materials (MoD, 2001).

3. Methodology

The structure was stripped of many of the very recent internal divisions prior to the building recording taking place. However, several breeze block structures were still *in-situ* in the main hangar area, as well as modern wall and floor finishes in the side rooms, which made it more difficult to survey the original ground plan and certain architectural features. For example, it was difficult to ascertain the positions of some original walls or doors. As such, where any uncertainty remains, walls have been classified as modern on the main schematic and modern doors have not been included, (Fig. 2).

A photographic record was made of the structure using a digital SLR camera set to 300 dpi x 300 dpi resolution. Photographs were taken of each external elevation, as well as internal details. These included images of the building's girder structure, positions of doorways, general room shots and any military graffiti or insignia.

An internal plan was made using a Total Station Theodolite (TST). However in many places this was not possible as the layout was obscured by very recent internal structures. In these instances measurements were recorded using tapes from known points on the TST plan.

Site data has been recorded using the Suffolk Historic Environment Record code MNL 641. An OASIS form has been completed for the project (reference no. suffolkc1-90036) and a digital copy of the report submitted for inclusion on the Archaeology Data Service database (http://ads.ahds.ac.uk/catalogue/library/greylit).

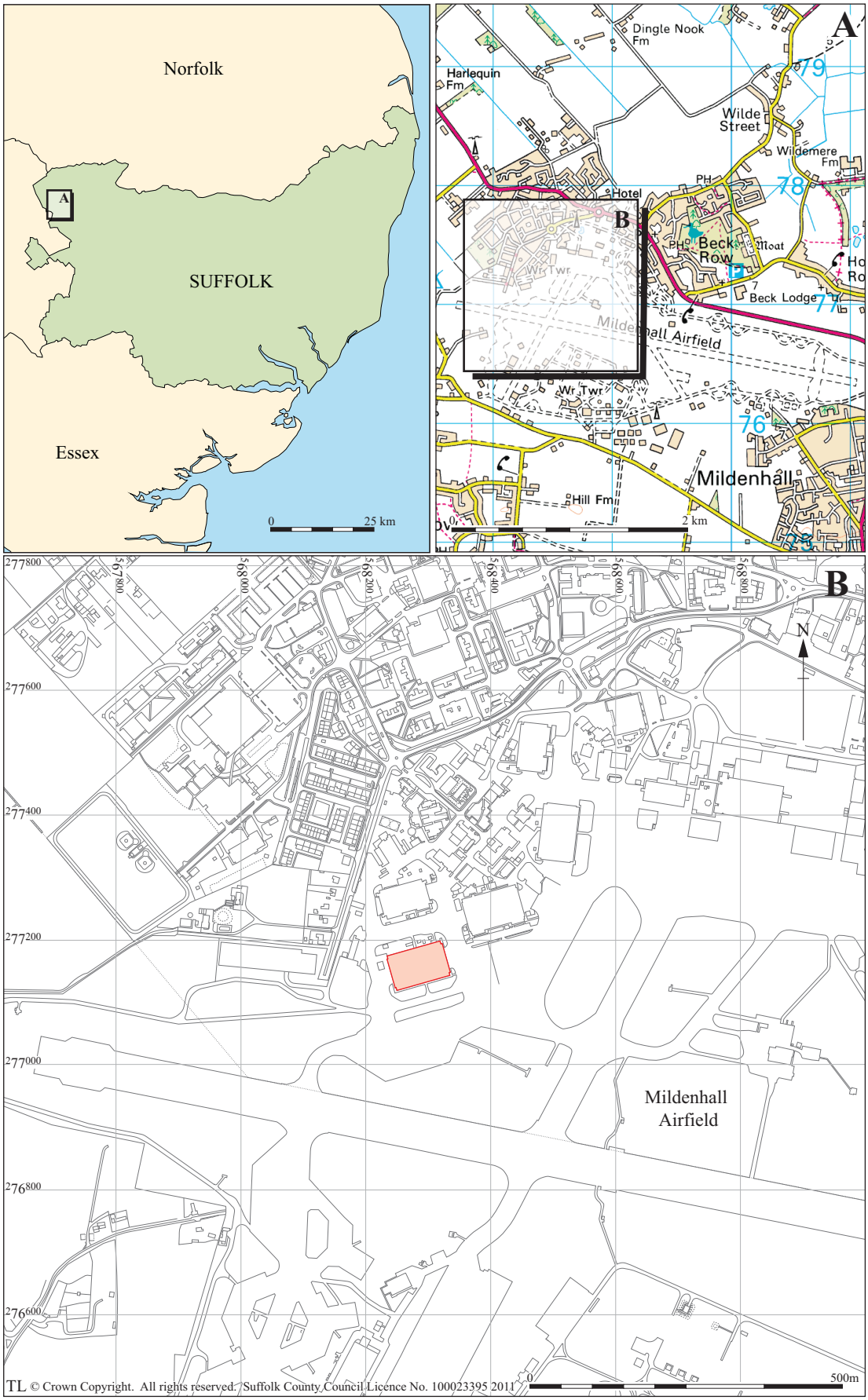


Figure 1. Location map

4. Results

4.1 Main hangar area

The main layout of the hangar was unaltered, being flanked by the single storey annexes, as was normal on most Type 'C' hangars (Plates 1 and 2). At the east and west end were the external sliding doors. Each set of sliding doors typically consisted of six doors, three on each side, which met in the middle and measured 10.75m high by 8m wide and weighed 12.5T (MoD, 2001). They were originally constructed from steel plate fixed to a steel frame and would open to the full width of the hangar. On Building 538 the surfaces of the doors had been replaced by newer metal sheeting externally, and by panelling internally. The overall structure of the hangar was made up of cavity brickwork with structural steel girders. The total length of the main building was 92m (WSW-ENE) or 93.4m including the thickness of the doors by 57.8m wide (NNW-SSE). The height of the building could not be ascertained as poor weather conditions hindered measurements being taken externally with the TST, however the internal height was measured at 10.7m to the base of the roof structure or 16.1m to the full height. The structure was set within a concrete slab, which was joined to the existing runway. It also had trench foundations.

At six metres up the main walls the windows of the structure start. These obviously provided light inside the hangar but were also designed to 'disperse the blast if an incendiary should come through the roof and thus limit damage to the hangar and its contents' (Buchan-Innes, 2000). Those in the end bays measured 6.7m tall by 1.6m wide, whilst those in the other bays measured 4.5m tall by 6m wide (Plate 3).

Two drains were recorded in the west and east ends of the hangar. These were covered with grating covers and ran the full width of the structure. They would have functioned to prohibit any surface water making its way into the main working areas. A further probable drain was positioned approximately halfway along the length of the hangar, slightly offset to the west. It was covered by manhole covers.

In the north-west corner of the main hangar was an impression of a Blackbird SR-71 reconnaissance aircraft (Plate 4 and Fig. 4). This had been made to mark the arrival of the Blackbird to RAF Mildenhall in the 1970s. Immediately west of this feature two areas of concrete had clearly been replaced. One of these ran into a recess into the northern

wall and was parallel with a blocked entrance on the outside of the building. It is uncertain what these alterations signified, although their close proximity to one of the drains suggests that they were associated.

Along the southern side of the hangar was a large metal tank. This was 2.2m tall x 2.8m long and 0.45m deep. It was painted white and had an oval plate riveted to the front, below which a small tap was positioned over a gully in the concrete floor. A further tap was found near the base on the western side of the tank. Its purpose is uncertain, as was its age, although it appeared to be of some age/contemporary with the hangar's construction.

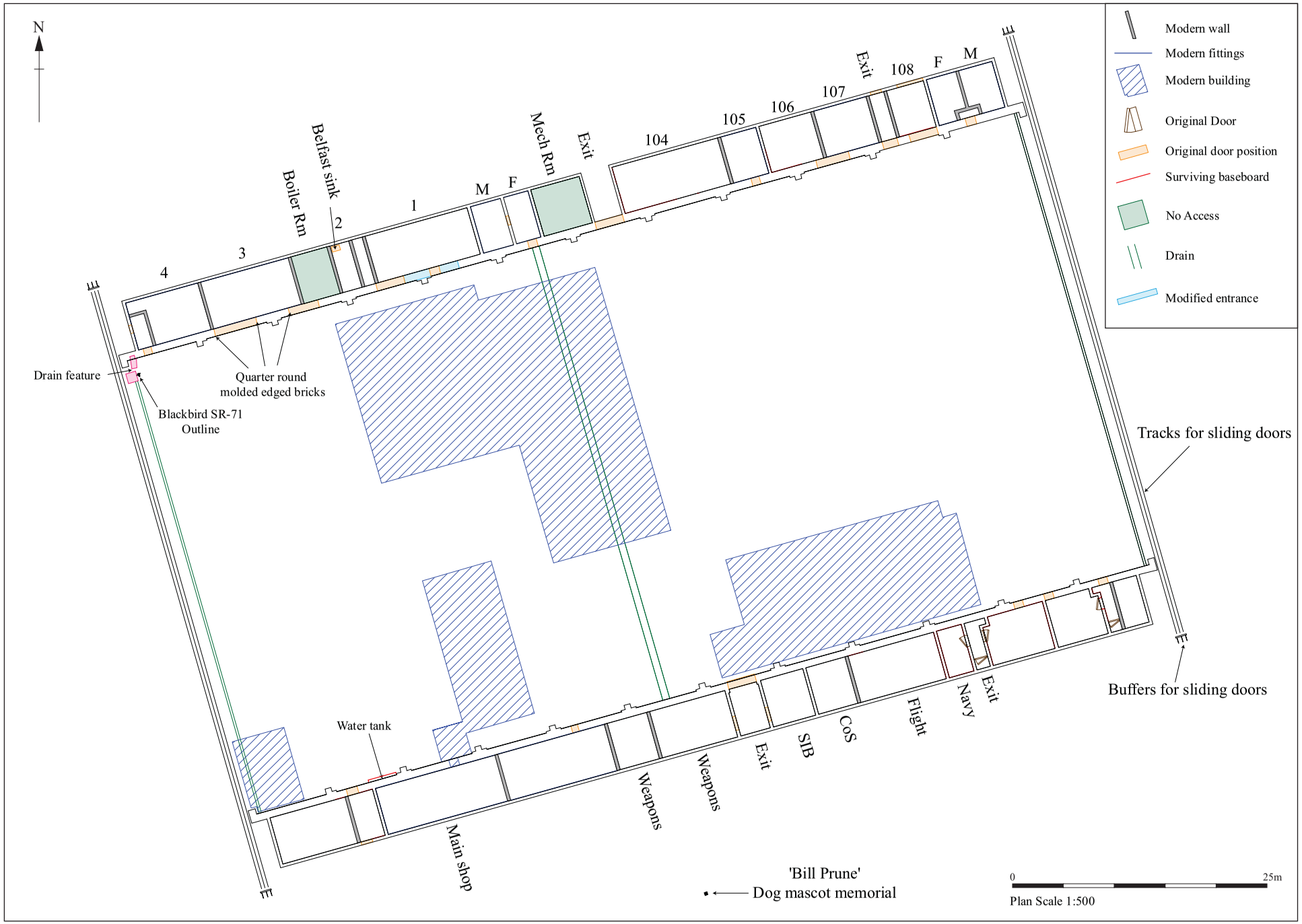


Figure 2. Plan of Building 538

4.2 Annex rooms

The rooms flanking the main hangar and shown on Figure 2 have been given various names and numbers to differentiate them. These names refer to those seen on modern plans of the annex rooms and are unlikely to refer to any original function. The rooms were all 4.7m wide (NNW-SSE) and varied in length, dependent on their original functions or on later modifications. The overall length of the annexes was 88.8m (WSW-ENE). The walls were not constructed with a cavity unlike those used for the main hangar.

In some of the rooms a mortar baseboard still survived partially. This was painted brown and indicated the presence of original walls and original room layouts (Fig. 2). The presence of original walls was also indicated by the construction method and material.

Northern annex

The layout of the annex rooms had been altered. It was clear that originally many of the northern rooms had been accessible by large doors suitable for bringing in machinery, etc. (Plate 5). Six of these doors were recorded in this annex. These varied between 2.8m and 5m wide by c.2.2m tall, although sometimes it was unclear if these were the original dimensions or whether they had been altered when the doors had been blocked up or altered. In particular the widest door (Room 1) was noticeably larger and different to the others, being marked by a pronounced recess into the wall. It was unclear, but this may have been two doors originally, particularly as it ran behind one of the structural columns (see ‘Modified opening’ on Figs. 2 and 3). From the layout of the surviving walls there had been at least five separate rooms which had made up the northern annex. However, in all likelihood several more rooms would have existed in the western half of the annex where very few original walls survived.

In Room ‘2’ a Belfast sink was present. If this is in its original position it may indicate one of the old washrooms typically found within hangars.

Three original external doorways were present in the northern annex, although one was blocked. The first was midway along the length of the annex, opposite one in the southern annex. This had a double door and led directly from the hangar area to the outside. Another external door was present in a corridor between Rooms 107 and 108.

The final door was a large opening seen in Room 108, which had subsequently been bricked up. No other large external doors were present in either annex.

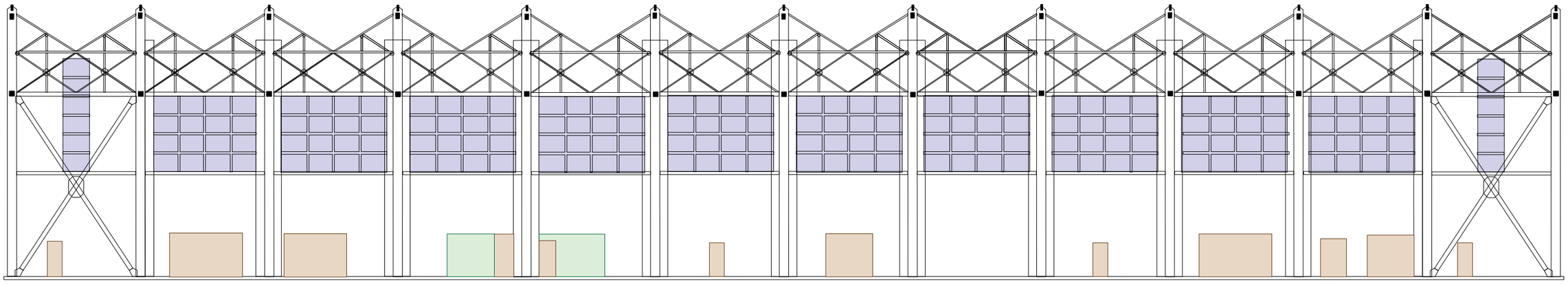
Southern annex

The rooms in the southern annex had also been heavily altered, particularly in its western half. However, in the east end of the southern run of annex rooms five original doorways were still in place and retained their original doors and the presence of the mortar baseboard showed that the room layouts still partially survived (Fig. 2).

In this annex four original exits were still present. It is thought that this reflects the proximity of the runway to this side of the building and therefore the necessity to enter and exit this side more regularly. The two doorways at the east end of the annex still had their original doors intact (similar doors are shown on Plate 6). Midway along the annex a larger external corridor with a double door was present, mirroring that in the northern annex. It had two doors leading east and west to the adjoining rooms as well as one to the main hangar. Near the west end of the annex was the final exit.

The lack of large doors entering this annex from the main hangar room was particularly noted. This may have been because modern structures inside the hangar obscured any blocked doorways and several of the annex rooms were also very heavily altered or finished with modern wall coverings. However, this does not account for the complete lack of these larger doors and suggests a different role for the rooms in this annex. A very thin blocked door or opening of some kind was present leading from the main hangar to the room between the Main Shop and Weapons rooms. It was 2.1m tall but only 0.5m wide and above it two openings were visible after the stripping of the modern fittings.

Northern internal elevation



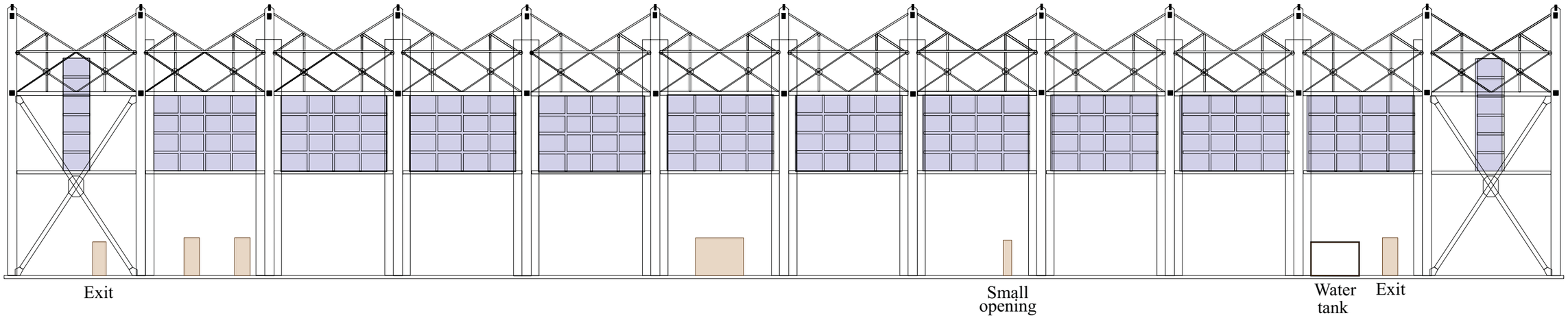
Window

Door opening

Possible double door

Cross-section of struts

Southern internal elevation



0 10m

Plan Scale 1:250

Figure 3. Internal elevations

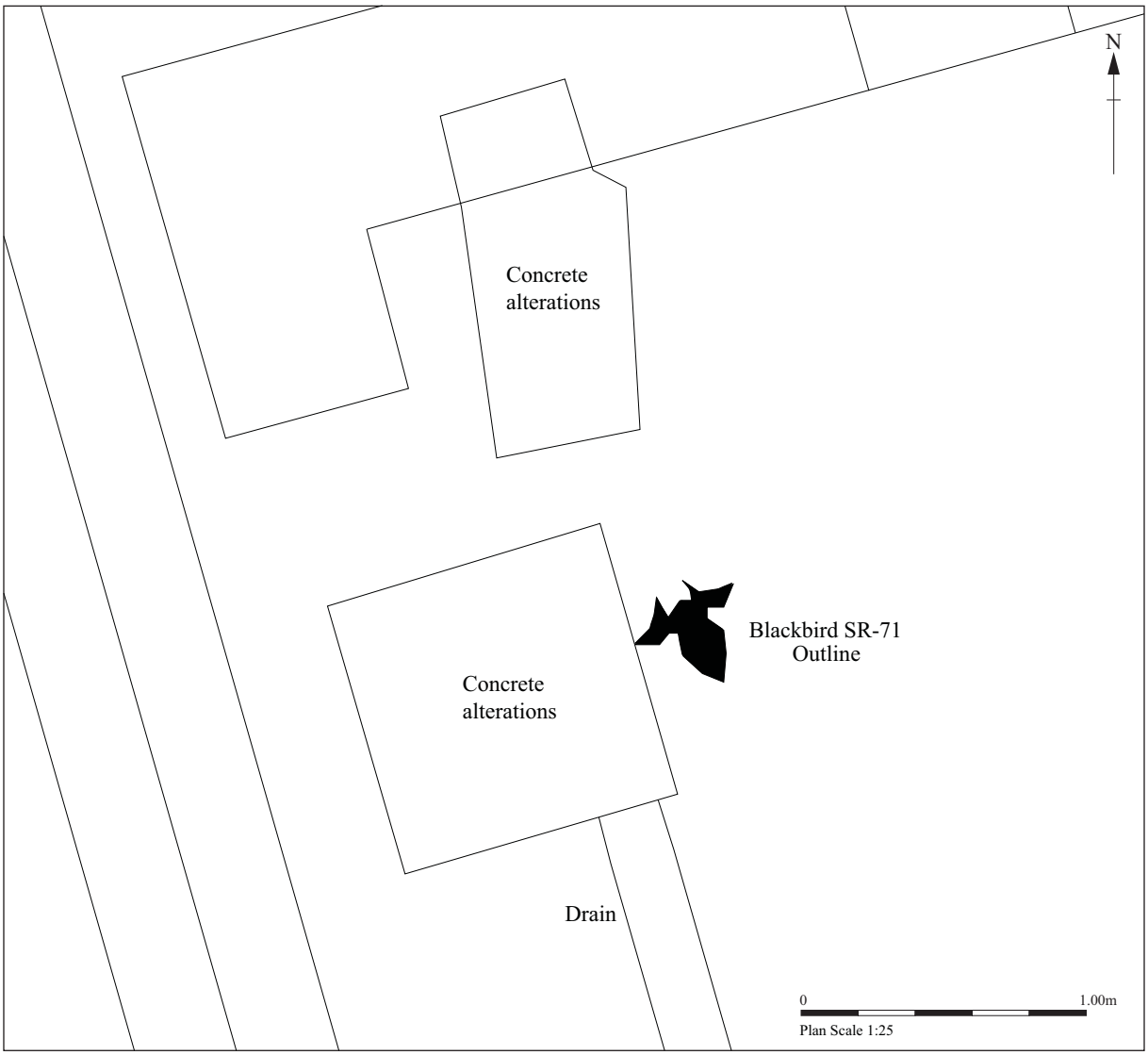


Figure 4. Blackbird SR-71 outline and drain alterations

4.3 Roof and framework structure

The roof was inaccessible, however as the Type 'C' hangar follows a standardised construction model, information from MoD 'Guide to World War II Hangars, 03 – Type C Hangars' (2001) has been utilised for this description (Plates 3, 7, 8 and 9):

> 'The main girders span the full 45.72m span (150 feet) across the hangar between the columns at 7.62 m centres (25 feet) and support the secondary trusses. For both the Type C34 and Type C38 hangars there are typically three separate main girders … The three girder types are similar in size and layout, but by utilising different member sizes have different capacities … The secondary trusses span 7.62m (25 feet) between the supporting primary trusses. The truss depth varies along its span, having the depth of 4.9m at the supports and 1.23m at mid-span, thus forming valley gutters. The original roof was supported directly on the secondary trusses via timber sarking and purlins'

The roof appeared to be largely unaltered, except for the absence of the original timber elements. It would have been originally covered either with asbestos cement slates or sheeting. A motorised winch was present and it was not clear if this was a newer addition, although if it were new, no clear additions had been made to the roof's structure in order to fit or operate it (Plate 9).

This roof structure joined directly on to the metal columns, for each pair of which were diagonal bracing struts (Plate X). All of these elements were fixed to the column bases, which typically comprised 'two I beams tied together by a system of diagonal lacing angles, and encased in concrete over their full height' (MoD, 2001). For further information regarding the technical aspects of the structure refer to Plates 3, 7, 8 and 9 and to the MoD reference (2001), which gives details on all the structural elements, including dimensions and function.

4.4 External features

The main external features were the tracks and buffers for the sliding doors. There was a groove in the concrete for each pair of opposing doors, which were hung on a metal rail structure (Plate 2). A buffer was present at the end of each track, made of metal brackets attached to the ground, with thick timbers attached to these to absorb the impact from the doors.

Metal ladders were fixed to both sides of each annex, leading to walkways which met further ladders leading up to the top of the main hangar structure for roof access.

Thirteen metres south of the hangar was a memorial, which read:

‘Nearby lies Bill Prune
Honorary Squadron Leader Bulldog Mascot
No 15 SQN Dec. 1943
Re-established Dec. 2003 100 ARW’

This memorial was reinstated by The Mildenhall Register, which is the 15, 90, 149, & 622 Bomber Squadrons’ Association.

5. Archive deposition

Paper and photographic archive: SCCAS Bury St Edmunds T:\Arc\ARCHIVE FIELD PROJ\Mildenhall\MNL 641 Building 538 rec & mon

6. List of contributors and acknowledgements

The recording was carried out by David Gill and Rob Brooks from Suffolk County Council Archaeological Service, Field Team. The project was directed by Rob Brooks, and managed by Andrew Tester.

The production of site plans and sections was carried out by Crane Begg and Gemma Adams. The report was checked by David Gill and Richenda Goffin.

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Appendix 1. Selected photographs

Plate 1. Building 538, north elevation (composite photograph)

Plate 2. Hangar doors, facing WSW

Plate 3. Internal elevation showing window and roof detail, facing SSE

Plate 4. Impression of Blackbird SR 71 aircraft (0.3m scale)

Plate 5. Blocked large door, converted into single door

Plate 6. Original doors

Plate 7. Internal, showing roof and structural detail

Plate 8. Roof structure of end bays

Plate 9. Winch