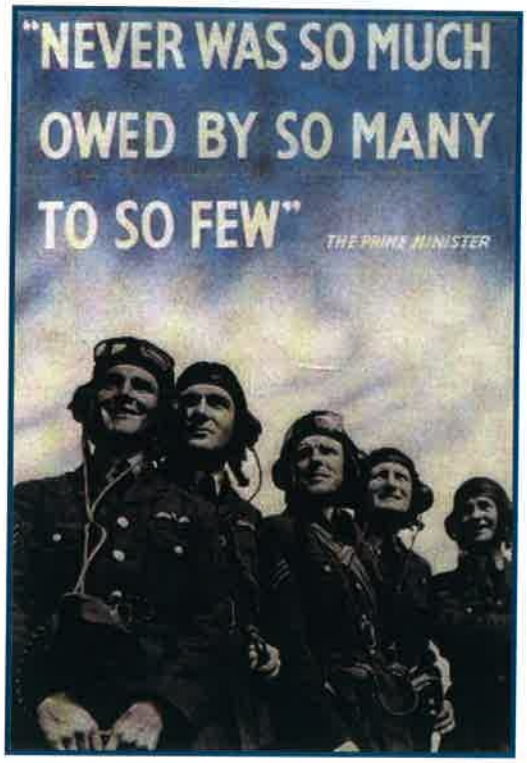

Operations Block (Building 27) RAF Northolt Hillingdon Greater London

Historic Building Recording

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Historic Building Investigation and Recording

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HISTORIC BUILDING INVESTIGATION AND RECORDING

SUMMARY

The Operations Block at RAF Northolt is of a standard design (1161/24), the same as many constructed at airfields in the mid 1920s. It is a bungalow with a plain utilitarian character and architecturally it is of limited conventional interest. However, it is of significance for its history, use and particularly its association with the Battle of Britain. Prior to the outbreak of the Second World War the airfields of Fighter Command had been divided into a series of Groups throughout the country and each group was divided into sectors. Northolt was the principal airfield in Sector Z and formed part of the significant 11 Group whose airfields took the main Luftwaffe attacks during the Battle of Britain and which was most heavily involved in the fighting. The sector operations room at Northolt would therefore have been a key part of the chain of command during the Battle by allowing the commanders to plot, monitor and strategically plan the battle. The Operations Block was in contact via telephone and teleprinter with radar stations, other Operations Blocks, Observer Corps stations, Fighter Command Filter Rooms, balloon depots and many other authorities so that positions of incoming enemy fighters could be tracked and squadrons based at Northolt scrambled.

This complex network of information formed part of the famous Dowding System of Defence and the Northolt Operations Block is particularly of interest as it acted as the prototype Sector Ops Block to be copied elsewhere. In addition its close proximity to Fighter Command HQ (Bentley Priory) and 11 Group HQ (Uxbridge) also added to its importance at a time when the telephone network was nowhere near as extensive or reliable as it is today.

However, although Building 27 is clearly of historic interest and it was recommended for listing at Grade II by English Heritage (following their thematic survey of military aviation sites) this recommendation was withdrawn and it now has no statutory protection (listing or Conservation Area status).

Various secondary alterations such as the replacement of almost all the windows, the re-covering of the roof, the removal of the Ops Room gallery ('dias') and the levelling of the blast banks slightly reduce the integrity and significance of the building as does the fact that Northolt's Operations Room was relocated away from Building 27 during the Battle of Britain. This was due to the vulnerability of the building from a direct hit during a Luftwaffe bombing raid on the airfield but it is also of course a recognition of the crucial importance held by the Operations Blocks and the Dowding System (the worlds first integrated Air Defence System) during the Battle of Britain. This is also demonstrated by the number of films such as 'Angels One Five' which have included numerous scenes of women from the WAAF pushing markers on large maps in Operations Rooms. It is now difficult to gain a clear sense of how the Northolt Operations Block would originally have appeared and films such as this, as well as the restored building at RAF Duxford, provide a vivid reminder.

It is not the purpose of the current document to clinically establish the significance of the Northolt Operations Block or whether it is worthy of listing. The key purpose is to record, interpret and investigate the structure (although of course to some extent appreciating the significance of the building is a key part of understanding and interpreting it). The recording has been undertaken at Level III prior to its removal in the redevelopment of parts of the airfield (Project MoDEL). The work has provided a record of the building and it has also allowed further investigation into its historic form and comparison with other similar Operations Blocks (eg at RAF Duxford).

1 INTRODUCTION

1.1 Background

1.1.1 Oxford Archaeology have been commissioned by Defence Estates to undertake a programme of historic building investigation and recording on Building 27 at RAF Northolt in Ruislip, Hillingdon, Greater London. The work forms part of a wider programme of building recording being undertaken by Oxford Archaeology at Northolt due to a massive redevelopment at the airfield known as Project MoDEL (Ministry of Defence Estate London Project). MoDEL will see the disposal of various MoD sites (including RAF Uxbridge, RAF Bentley Priory, Inglis Barracks and RAF Eastcote) and the concentration of these facilities at Northolt to create a larger 'anchor' site. Niall Hammond (Defence Estates Senior Historic Buildings Advisor) issued a brief dated 18 January 2007 detailing the recording works to be undertaken at Northolt.

1.1.2 Building 27 was constructed in the 1920s and formed the airfield's Operations Block where battles or flight operations would be tracked and monitored.

1.2 Aims and objectives

1.2.1 The overall aim of the project is to create for posterity an archive record of the building concentrating on its construction, history, development and use. The work aims to record, interpret, understand and explain the building. The other main objective is to deposit this record (both the report summarising the building and the primary archive itself) in publicly accessible repositories.

1.3 Methodology

1.3.1 The recording of Building 27 has been undertaken at the 'High' level as detailed in the project Brief (18 Jan 07) which broadly corresponds to English Heritage Level III (Understanding Historic Buildings, 2006). The structure was recorded in its current form before the start of works and this consisted of three principal methods: a drawn record, a photographic record and a written record.

1.3.2 The ***drawn record*** comprised producing a measured plan of the building at 1:50 as well as elevations at 1:100. Descriptive annotation was added to the drawings to indicate construction, structural breaks, evidence relating to the structure's use and other features of historical interest. The recording followed IFA Standards and Guidelines using conventions outlined in *Understanding Historic Buildings: a Descriptive Specification* (English Heritage, 2006).

1.3.3 The ***photographic record*** was undertaken using 35mm film (black and white prints) and with a digital camera (Ricoh Caplio 400G). It included general shots of the building (external and internal) and specific details. Photographic record sheets

where used to indicate the location and direction of each shot and any further detail. Automatic flash lighting was used to illuminate dark interiors.

1.3.4 The ***written record*** complemented the other two survey methods and added descriptive and interpretative detail. The site recording of Building 27 was undertaken on 19-20 April 2007.

1.3.5 A limited programme of historical research has been undertaken using the principal secondary sources (see Bibliography) but this has not included the RAF Museum Hendon, the National Archives at Kew or the Greater London SMR. Group Captain Steve Lloyd RAF Rtd, Deputy Head of the Air Historical Branch (RAF) has been consulted in the current work and he has very helpfully provided copies of relevant historical material.

1.4 Acknowledgements

1.4.1 Oxford Archaeology would like to thank Sergeant Mark Bristow (Northolt Station Historian) and Group Captain Steve Lloyd Rtd, Deputy Head of the Air Historical Branch (RAF) and Terrence Thomas for their help researching the history of Building 27.

2 HISTORICAL BACKGROUND

2.1 RAF Northolt

2.1.1 Northolt Aerodrome was originally established during the First World War as one of a number of new training aerodromes constructed to cope with the many new volunteer pilots and it was officially opened in 1915. The airfield was designated a Home Defence night landing ground and No 18 Squadron of the Royal Flying Corps was formed at the base. At the end of the war many airfields were closed but Northolt survived with the status of a training depot station and it also served the function of a test flying ground. No buildings are known to survive from this early phase of the airfield although there is currently speculation that Building 13 a World War I structure.

2.1.2 In the years immediately after the end of the Great War the airfield served both a civilian function in providing facilities for private companies and individuals and a military function. In the 1920s a number of squadrons were formed at Northolt, some of which rapidly moved to other aerodromes but others such as No 41 Squadron which remained for many years.

2.1.3 The most important figure in the development of the RAF during the 1920s was General Sir Hugh Trenchard, the first Chief of Air Staff, who oversaw the establishment, development and expansion of the RAF. This was principally from 1923 when parliament approved his plans and Northolt was among the first of Trenchard's new (or expanded) airfields which received Treasury sanction in March 1924.

2.1.4 Northolt formed a fighter base as part of the Air Defence of Great Britain scheme and it was expanded and developed from 1925 when new permanent buildings were added including the Barracks, the Operations Block and the Station Headquarters. Air Estimates state that by March 1928 £92,500 had been spent on hangarage, a watch office, accommodation and operations Block.

2.1.5 The second half of the 1930s was a period of rapid growth and change for the RAF as attempts were made to match the even faster expansion of the Luftwaffe in Germany. One of the changes which had a direct impact on Northolt, and which provides a sign of the preparations for war was the decision in May 1936 to transfer Northolt to No 11 Group Fighter Command, whose headquarters were at nearby RAF Uxbridge. It is as having formed part of this group that gives Northolt one of its principal historical significances due to its role in the Battle of Britain.

2.1.6 The airfield development programme of this period included a recognition that paved runways rather than grass were essential due to the increasing use, larger planes and particularly to ensure continued operation use in wet weather. This decision proved of critical importance during the Second World War (particularly the Battle of Britain) and in 1938 Northolt was one of eight fighter stations to be provided with two hard runways of 800 yards by 50 yards. Northolt's other preparations for war included the laying out of a perimeter track, new hangars and standard H-blocks for accommodation and a system of camouflage which included the painting of houses onto hangars and hedgerows on the ground.

2.1.7 The airfield was also of note during this period for being the first base of the new and hugely important Hawker Hurricane which was introduced in 1937 with III Squadron. After the outbreak of war in September 1939 Heston became a satellite of RAF Northolt and a dummy airfield with wooden aircraft to fool enemy bombers was laid out at a nearby golf course.

2.1.8 The first phase of the war has become known as the Phoney War due to the lack of significant combat and the various (and frequently changing) squadrons based at Northolt saw little meaningful action until the summer of 1940. However, this situation changed drastically in May 1940 when Fighter Command had to provide air defence during the evacuation of the British Expeditionary Force from Dunkirk with many patrols being flown from Northolt.

2.1.9 Following the capitulation of France German air raids on channel shipping as well as coastal towns increased during June and then July saw the start of the onslaught of the Battle of Britain. Throughout August and the early part of September the Luftwaffe launched near daily raids on airfields, radar stations and other establishments in the south-east corner of England and fighter squadrons based at Northolt were each day scrambled to engage and repel the enemy. The aim was to effectively destroy the RAF and achieve air supremecy which would allow the seaborne invasion of England. Luftwaffe losses were consistently greater than those of the RAF and during September there was something of a change in tactics

by the Germans which saw bombing raids on London itself and the start of the blitz. By the end of October attacks on airfields had virtually ceased, the Battle of Britain had been won and bombing raids now concentrated heavily on London and civilian targets. However, fighter squadrons from Northolt (and the other airfields) remained in action to repel these raids.

2.1.10 Northolt is one of the airfields most closely associated with the Battle of Britain due to it forming part of 11 Group which was in the front line of defence during the Battle and whose airfields bore the main brunt of the Lutwaffe attacks. Northolt itself (which was the headquarters of 11 Group's Sector Z) only suffered relatively light damage however and partly due to this (and its consequently good condition) it received a number of prestigous visitors including King George VI, Churchill and high ranking officers. The location of the station immediately adjacent to the Western Avenue (A40) would also have been very convenient for such visits. Many of these visits would have been to the Operations Room to observe reports of the progress of battle being received although (as detailed below) it appears the Ops Room was relocated for much of the battle away from Building 27.

2.1.11 Throughout much of the war, including the Battle of Britain, several Polish squadrons were based at Northolt, including No 303 Squadron which had been formed in August 1940 comprising Polish Officers, pilots and ground staff.

2.1.12 Northolt remained a fighter base until 1944 and squadrons based there undertook many operations such as escorting bombers on raids over enemy territory. By then its runways had been lengthened to allow it to act as a base for transport aircraft, a function for which its location was ideal, and this was where its principal future lay. Immediately after the war it was designated as London's airport (together with Croydon) but reverted to military use when this function was taken by Heathrow in 1954.

2.1.13 Although parts of the airfield have seen post-war redevelopment English Heritage's thematic listing survey states that after Biggin Hill Northolt is 'the 11 Group Sector station to have retained most of its original built fabric'.

2.2 Operations Blocks

2.2.1 Principal aerodromes under the Air Defence of Great Britain Scheme such as Northolt had an Operations Room where campaigns (or particularly battles during times of war) would be monitored, strategies planned and instructions relayed to pilots. The Operations Block has been described as the nerve centre of the airfield where a series of communications networks would converge.

2.2.2 The Operations Block at Northolt (Building 27) was constructed in c.1925 and conforms to the standard type (1161/24) of the period intended to be used for up to three squadrons. This is outlined in *British Military Architecture* by Paul Francis (see page 46-47) and is reproduced here at Figure 2.

2.2.3 By the time of the Second World War Northolt formed the headquarters of Sector Z of the 11 Group of Fighter Command and as such it formed an important part of the defensive chain of command network (The Dowding System - named after Air Chief Marshall Sir Hugh Dowding). The Ops Block at Northolt would have been in telephone, radio and teleprinter contact with numerous other elements of the network including other sector operations rooms, Group headquarters Ops Room (Uxbridge), Fighter Command headquarters (Bentley Priory), radar stations, Royal Observer Corps stations, filter rooms and balloon depots. In addition the locations of the individual planes in Northolt-based squadrons could be tracked by taking cross-bearings from the planes radio telephones. It is believed that this was undertaken in a small extension, probably built in the later 1930s, at the east end of the original building. The Royal Observer Corps was for tracking enemy planes inland where radar couldn't trace them while the filter rooms were where radar reports (and other messages) were filtered of unnecessary information before being passed to the Operations Rooms.

2.2.4 All the processed information such as the locations of the airfield's squadrons, as well as that of enemy planes, would be plotted on large maps in the Ops Room and updated as further information was received.

2.2.5 Building 27 at Northolt is particularly of interest as documents at The National Archives (passed to OA by Grp Capt (Rtd) Steve Lloyd) show that in the late 1920s and early 1930s it formed a prototype for other Operations Rooms where some communication technologies and elements of the defence system were tested. This may have been due to the close proximity between Northolt and the Fighter Command headquarters at Bentley Priory and the Group Headquarters at Uxbridge.

2.2.6 Operations Rooms constructed in the 1920s such as at Northolt were surrounded by 7 foot high blast banks to protect against sideways impacts but they had a standard timber roof which rendered the building highly vulnerable to a direct hit. In contrast the Operations Rooms constructed at airfields in the mid and later 1930s were much more heavily protected with concrete roof and blast walls. In addition the standard layout of the 1920s airfield saw the Operations Room located close to the main technical buildings of the airfield, where enemy bombers would be likely to target, whereas the 1930s airfields saw the Operations Room dispersed away from the technical buildings. RAF commanders were well aware of the vulnerability of these early type Operations Blocks and a number were replaced in the 1930s with the reinforced structures. In addition at many sector airfields (particularly those in 11 Group such as Northolt) where the original Operations Block was not replaced contingency plans were established for their relocation two or three miles from the main aerodrome. Possible sites were earmarked and on May 16th 1940 a shop immediately adjacent to Ruislip Manor Tube station was requisitioned to allow the relocation of Northolt's Ops Room when necessary (Battle of Britain Then and Now). A second adjacent shop was also later acquired.

2.2.7 The facilities at the dispersal Ops Room would have been far less convenient than the purpose built Building 27 and presumably due to this the Ops Room initially remained in its original location. However, at the very end of August a direct hit on the same type of 1920s Operations Room at Biggin Hill resulted in the complete destruction of this building and the relocation of the other Sector Operations Rooms was then rapidly undertaken.

2.2.8 There were a number of difficulties at the new station such as the fact that while the WAAF had WC facilities the RAF had to use adjacent station facilities! Of rather more importance was the fact that although the dispersal Ops Room could receive radio messages from the planes they were controlling they could not reply to the messages. Outgoing messages had to be relayed to the main Northolt airfield by telephone (presumably to Building 27) and then forwarded by radio to the pilots (Ramsay, 1982). Due to this the Ops Room returned briefly to Building 27, apparently after the end of the Battle of Britain, prior to moving to a permanent dispersed location at Eastcote Place, a nearby mansion set in its own grounds.

2.2.9 King George VI visited RAF Northolt on 26 Sept 1940 and it is known that on the same day he was also taken to the dispersal Ops Room in Ruislip to observe the operations during an engagement. *A History of RAF Northolt* reports that he 'showed particular interest in the Sector Operations Room which had recently been established'.

2.2.10 It also appears that the Ops Room underwent some relocation (possibly just partially) before the Battle of Britain. *The Battle of Britain: Then and Now* reports that in May 1940 the Sector Z Ops Room was located in a W/T (wireless telegraphy) hut (Building 40 - now demolished) but that just before the Battle of Britain it was moved to Building 27.

2.2.11 In addition two websites have been found in the current research (http://www. subbrit.org.uk/rsg/sites/b/bawdsey/index2.html and http://www.raffca.co.uk/ asp/ basepage .asp?pagename=sfchist) which report that a fighter control training unit was formed in the 'old' Operations Room at RAF Northolt in June 1940. The Fighter Control Association web site reports that the Controller Training Unit at Northolt 'consisted of a lecture room, a Sector Operations Room, one synthetic trainer and an office. The staff was equally small comprising one squadron leader (sqn ldr), one flight lieutenant (flt lt) Adjutant, two corporals (Cpls) and six airmen. Originally the course lasted two weeks and was designed to standardize the training of controllers throughout the Command. Lectures on background subjects were given as well as the practical training'.

2.2.12

2.2.13 Building 27 now houses offices for the Engineering Support Flight and Finance Section and it is known to have previously (1970s-1980s) housed classrooms for the Education Section.

3 DESCRIPTION

3.1 Introduction and phasing:

3.1.1 Building 27 comprises three principal constructional phases:

- the primary, mid 1920s building including the main rectangular plan range and the projecting plant room;
- a relatively early (pre-World War II) extension at the east end;
- a later extension (1970s?) at the centre of the south elevation which provides WC facilities. This is shown on a photograph of c.1980.

3.2 Surrounding landscape

3.2.1 A concrete-paved walkway (c.1 m wide) wraps around the perimeter of the building and this, together with the main ground floor of the building is set slightly below the level of the surrounding lawn. This necessitates a gulley which runs around the edge of the building to carry rainwater to a drain at the west end and it provides a clue to the former earth banks which would have surrounded the building to protect it from sideways blasts or impacts. The banks have now been substantially levelled and only a faint trace is now visible. Banks such as these would have been constructed around each 1920s Operation Block of the same type as that at Northolt and these survive at a number of sites such as RAF Duxford and Filton in Bristol. These would have been c. 2 m tall and would have stretched around the whole building other than an opening at the centre of the south wall for the entrance. At this point a separate, staggered bank would have been sited beyond the opening to provide projection.

3.2.2 Although the banks have been cleared an undated oblique aerial photograph survives in *The Battle of Britain, then and Now* (242) which shows them intact and conforming to the standard type which survives at Duxford. A second photograph on the same page which probably dates to c.1980 confirms that the banks had been cleared by this date. There are also a number of surviving clues in the fabric of the building which also provide evidence of the former banks. These clues include a small protective concrete shield surrounding a stopcock, which survives on the south side of the building close to the plant room. This stopcock would have been located at the base of the blast bank and the shield would have protected the stop cock. The plant room would have projected into the blast bank at the south-west corner of the building and its now-exposed walls provide further evidence of the banks in a silver coating that follows closely the former outline of the embankments.

3.3 External description

3.3.1 The ***main building*** is a single storey, yellow stock-brick structure (English bond) with a slate-covered hipped roof which incorporates seven small raised louvres along its ridge. Both the louvres and the slate covering are a secondary replacement probably dating to the relatively recent (1980s - 1990s?) conversion of the building into offices. A photograph contained in *The Battle of Britain Then and Now* (p. 242) which was probably taken c.1980 confirms that the original roof covering survived at that date and comprised diagonally set tiles (probably asbestos) of a standard type found on other Operations Blocks and Airfield buildings of the inter-war period. The photograph confirms that the original roof did not incorporate the small ridge louvres which survive today but it did incorporate a single tall up-standing feature (vent or chimney) to the east of the centre.

3.3.2 All the external windows have been replaced in recent years with pvc windows although the primary concrete sills and lintels largely remain in-situ. The c.1980 photograph referred to above shows the original windows and confirms that they were of the standard Crittal type that do survive at other Operations Blocks. The guttering and rainwater goods have similarly been replaced. The eaves are open with the rafter feet visible and there is a low rendered plinth.

3.3.3 The ***north elevation*** comprises ten windows with the central two which illuminated the wireless room being wider (1.5 m) than the others (1.1m). Beneath most of the windows is a small plain vent within the plinth and towards the centre of the elevation are two square openings (one now blocked) which would have allowed cables into the central wireless room. These openings are c.20 cm by 20 cm and they are lined with a c.10 cm thick concrete lining which would have extended through the depth of the wall.

3.3.4 The ***west elevation*** comprised three main windows (in contrast to the standard two windows shown on the standard 1161/24 plan - see Fig 2). There is additionally a small window in the plant room. Between the central and the northernmost window is a low concrete pier with a lead flap covering its sloped top. The function of this pier is unclear.

3.3.5 The ***eastern elevation*** of the main building is hidden behind the extension at this end of the building. The extension is more ephemeral than the primary building being constructed in single skin (stretcher bond) brickwork up to c.1.3 m and a weatherboarded stud frame above this. The weatherboarding is now painted green but on the c.1980 photograph it is shown white. It has an asphalt-covered gabled roof with a north-south spine and has something of the appearance of a large garden shed. It has two windows and a door in its east elevation (all of which are secondary replacements) and a single window in its north elevation.

3.4 Internal description

3.4.1 The interior of the building (excluding the porch and the primary plant room) divides into nine main rooms, including two in the eastern extension, and a long corridor along the south side of the building. The rooms are now entirely offices for the Engineering Support Flight and Finance Section. The layout of rooms follows very closely that of the standard 1920s Operations Block (1161/24), shown in *British Airfield Architecture* (Francis, 1996) which also indicates the historic use of each room. In this report it has been assumed that each room at Northolt followed the primary uses shown on the standard plan but conclusive evidence to prove this has not yet been seen. In addition, it may well be that the rooms uses had changed after initial construction but before the outbreak of the Second World War. Discussions with Steve Lloyd of the RAF's Air Historical Branch suggest that the AHB have located much information about the building and it may be that during a later phase of historical research to cover the whole Northolt site the precise use of each room will be clarified.

3.4.2 The general character of the internal rooms is of a modern office with plastered walls, fluorescent lights, low skirtings (13 cm tall) with sloped top, carpet tiles, vertical blinds to windows and modern furniture. There are no cornices and only very plain architraves. The doors are almost entirely plain secondary firedoors and it is difficult to gain a clear sense of what historic form the rooms would have taken. There are several full length notice boards in the offices but these appear to be relatively modern and almost certainly date to when the building was converted to offices.

3.4.3 The west end of the building divides into two rooms separated by a single skin brick wall with a doorway and one of the few primary doors in the building (4-panels, non moulded). The standard layout suggests that the smaller room to the north would have been a *Store* while the larger room to the south was a *Wireless Telegraphy (W/T) workshop*. The former store has a pair of small, truncated iron, T-shaped brackets which would have projected from the east wall at a height of c.2m above the floor. They are c.50 cm apart and they may have held a WC cistern.

3.4.4 The former W/T workshop has a ceiling hatch which would have provided access to the roof space and hot water pipes which extend through the south wall from the plant room. This is one part of the building which does show some differences with the standard Operations Room layout (Fig. 2). There are two windows in the west wall (unlike the one in the standard building) and there is no chimney towards the north-west corner of the room (shown on the standard block). The fact that there is no chimney is a reflection of the fact that the plant room at Northolt is outside the footprint of the main building (immediately to the south) whereas the standard layout shows it as a full basement beneath the W/T workshop and store. Therefore the chimney from the plant room would have risen through the workshop whereas at Northolt it is adjacent to the main south wall of the building.

3.4.5 To the east of the store and workshop, occupying the main body of the building, are four rooms off the corridor which extends along the south side of the block. The layout of the standard Operations Block suggests that the westernmost of these rooms would probably have been the *PBX Room* (Private Branch Exchange) and that it would have had a telephone switchboard. The most significant feature of the room is an internal window in the south wall which would have let light into the room via the corridor. This is metal framed (4 x 4 lights with a horizontally hinged 4-light hopper casement) and is almost certainly primary.

3.4.6 The room to the east of the PBX room is narrower than the other rooms and according to the standard layout this would have been the *Battery Room*. Although the footprint of the room is primary it retains almost no original features. There is a hatch (c.60 cm tall, 1 m above floor, 80 cm wide) towards the north end of the east wall and this could have been a primary feature to allow cables between the rooms. The standard layout of an Operations Block does not show a hatch at this location but it is interesting to note that the plan does show a hatch in the north-east corner of the room to the east so it may be that there was a slight difference in the standard plan and that at Northolt.

3.4.7 At the centre of the building is the largest room (other than the main Operations Room itself) and this would have been the *Wireless Room*. The two windows in the north wall are wider than the others in the north elevation (an arrangement which corresponds to the standard Ops Block) and as referred to above there are two concrete lined holes in the north elevation to allow cables into this room. These holes are at the west end of the wall and towards the centre of the wall (between the two windows. There is an internal window towards the west end of the south wall which is primary (or an early addition) and which allows light in from the corridor. This has a timber frame and 12 lights. The most interesting features which relate to the historic use of the room are five small hatches/openings in the ceiling which are broadly evenly spaced apart. Each of these is c.20 cm² with a simple softwood frame around it and two of the holes have the partial remains of electrical devices (insulated wires, transformer wires?) extending through the hatch (Fig. __). Clearly each of the five holes would have had similar wires extending through them and they would have related to the wireless operations undertaken in the room.

3.4.8 To the east of the *Wireless Room* was (according to the standard plan) the *Signals Office* and at Northolt the floor height of this room is raised by c. 1 m to be at the same height as an observation gallery which would have been in the adjacent Operations Room.

3.4.9 The most interesting feature of the building in terms of its historic use is the east wall which incorporates a 4.2 m long former opening which would have allowed a visual link between this room and the Operations Room. This former opening has now been blocked with a secondary partition (which incorporates three small windows) but comparison with other Operations Blocks (particularly RAF Duxford - see below) suggests that this opening would have comprised a series of large

windows and openings. The two rooms would have been separate to lessen noise disturbance but messages would have had to have been passed rapidly from one room to the other through hatches and openings.

3.4.10 The south wall of the *Signals Office* is a stud partition and this is likely to be a secondary alteration as none of the other primary walls are of similar construction. The standard plan does show a wall at this location but it would probably have been of brick. It may be that the room was originally a Signals Office (as suggested by the standard plan) but that it was then altered with the demolition of the south wall to provide a larger space. The stud partition is therefore likely to date to the conversion of the building to offices and it incorporates a sliding access hatch. Due to the raised floor height the sides of the ceiling in the Signals Office are sloped as the room extends up partially into the roof space and there is a ceiling hatch which provides access to the roof-space.

3.4.11 The corridor extends along the south side of the building between the rooms at the eastern and western ends of the primary structure. It has a roll-moulded skirting board and two partition screens to the west of the entrance to divide the space. Also to the west of the entrance is a set of electrical gear (isolator). To the east of the entrance is a plain staircase which is almost certainly primary and which provides access up to the artificially raised level of the Signals Office and the Operations Room Observation platform.

3.4.12 The room at the eastern end of the primary building is the Operations Room itself and as such is the most significant part of the building (as well as the largest room). This is where the sector commander (and a team of staff) would have been located during key periods and from where Northolt-based squadrons would have been scrambled and then commanded prior to them actually entering battle. There would have been a large map table on the floor showing the south-east of England and the channel and (as seen in numerous films) with counters or markers on the table indicating the locations of squadrons. These would have been moved as updated information on the movements of RAF Squadrons and the Luftwaffe was received.

3.4.13 The floor height of the room is c.1 m below that of the adjacent Signals Room and it is reached by a simple set of stairs at the south-west corner of the room. The stairs are of very plain, utilitarian design (square section newels and handrail with no balusters) and they appear to be original but their location does not correspond with the form of other Operations Rooms or with how the room would have functioned. The purpose of having the floor of the Operations Room at a sunken level was to allow a better overview of the map to be gained from a raised position (the 'Dias'). In its current form the only raised position in the Operations Room is the small landing (1 m^2) at the south-west corner of the room between the door and the stairs. In its original (and WWII) form there would definitely have been a substantial gallery at the raised height inside the room. This would almost certainly have extended north to south across the room adjacent to the large former screen dividing the Operations room from the Signal Room. If this followed the form of

the Operations Room at Duxford the gallery would have projected forward at one point where the main controller would have sat and the gallery would also have extended around the southern edge of the room. At the south-east corner of the room is what appears to be a blocked doorway (only visible from opposite side of wall) at a raised height which would have provided access to the gallery along the southern edge of the room.

3.4.14 The stairs could probably have been moved relatively easily in one section and this would presumably have been undertaken when the room was converted to offices (or to a classroom) to gain more floor space. Physical evidence also supports this theory as the skirting board which extends down the west side of the stairs does not continue at the bottom along the wall as it would have if the stairs had always been in this location. A plain later staircase has been added along this wall in its place. In addition a small post has been added at the top of these stairs, adjacent to the skirting, which is also awkward and would not have been part of the primary arrangement. As stated above the west wall of this room (shared with the adjacent Signals Room) would have comprised a large, glazed opening with many hatches to allow messages to be passed from the Signals Room to the 'Dias'.

3.4.15 The dominant feature of the room is now the roof structure which is substantially visible unlike elsewhere in the building. This comprises a north to south king-post truss and an east to west half truss to support the hipped end to the roof. The west end of the half truss is bolted to the centre of the full truss with two L-shaped brackets and 8 bolts to each. The truss members are all regular machine-sawn softwood and regular sizes: tie-beam (30 cm x 12 cm); principal rafter, king-post, raking struts (all 12 cm^2). Towards the ends of both the half truss and full truss the principal rafter is secured to the tie with a U-shaped iron strap that sits in a notch in the underside of the tie and is fixed by a plate bolted immediately above the principal. The upper part of the roof structure is hidden by a boarded ceiling with a simple supporting frame.

3.4.16 The Operations Room would have been at the east end of the original building but an extension with two further rooms was added after the original construction of the building but before the start of (or possibly during) the Second World War. Group Captain (ret) Steve Lloyd of the RAF's Air Historical Branch has confirmed that it would have been added in the late 1930s (or possibly very early 1940s) during the development of the Dowding Defensive System.

3.4.17 Group Capt (ret) Lloyd has stated that this room was used as a filter room (to 'filter' information before the key elements were passed to the Ops Room) particularly relating to night flying. The main filtering of information was undertaken at Fighter Command Level but it appears to have become clear that at night time, with the far smaller number of flights, this filtering could be delegated down the chain to the Sector Ops Rooms. Group Captain Lloyd also believes that it was used in the control of searchlights and he has added that this would explain

why potentially in some readings this hut is referred to as the searchlight room and in others it is the filter room.

3.4.18 *The Battle of Britain Then and Now* (Ramsay, 1980) and English Heritage's Thematic Review each give a different use for this block (which may have been in addition to that suggested above). These two publications state that the extension has a plotting table where the cross bearings of Sector fighter aircraft would be plotted and then the results passed to the main adjacent Operations Room.

3.4.19 The extension comprises two rooms: that to the north being half the size of that to the south and two doorways have been created in the east wall of the original building to provide access to the rooms. These doors each partially utilise primary window openings and it is interesting to note that this end of the original building appears to have only had two windows (unlike the west end which had three).

3.4.20 The east face of the primary building's originally external east wall is of painted (but not plastered) brick. At the southern end of this wall is a 2 m tall alcove which is 90 cm above floor level and 75 cm wide. It may be that this was a doorway directly into the Operations Room and to the raised gallery which it is believed originally extended along the south edge of that room. This doorway may have been primary (ie pre-dating the extension) but it may well have remained in use after the construction of the extension to allow easy access between the rooms. There would presumably have been a small set of steps adjacent to the doorway.

3.4.21 The two rooms in the extension are divided by a stud partition screen with a central door and two ribbed-glass windows. This partition is likely to have been a secondary alteration as a single space would appear more logical and the same type of extension to the Operations Room at Duxford comprises a single room.

3.4.22

3.4.23 At the south-east corner of the building is partially sunken plant room which is part of the primary 1920s construction and which projects outside the main footprint of the building. Access into the small room was not possible during the current recording but a window in the west wall has allowed a visual inspection. A simple set of stairs leads down from a door in the east wall of the structure into the plant room and there is a tall chimney at the north-west corner (outside the line of the main building). It is known from *British Military Airfield Architecture* that as Operations Blocks at Fighter stations such as Northolt were detached buildings (unlike those at Bomber stations) they were provided with a separate room to house a heating chamber.

4 COMPARISON WITH OTHER OPERATIONS BLOCKS

4.1.1 As stated above the Operations Room at Northolt was constructed in c.1925 to a standard RAF design (1161/24) which was replicated at many other airfields in this period. Among other Operations Blocks of the same type which are known to

survive is one at RAF Duxford which is preserved and protected as part of the Imperial War Museum's historic airfield. Half of the building, including the Operations Room itself, is open to the public and it has been restored relatively accurately to its wartime form. The overall form of the Duxford building is strikingly similar to that at Northolt and many elements or features are identical. These include the hipped roof, the English bond brickwork, the basic window layout, the plant room location, the chimney, the small gabled weatherboarded extension adjacent to Operations Room, the exposed rafter feet, the roof trusses visible in the Operations Room and the simple partition boards found widely.

4.1.2 The most obvious differences are features which have been altered at Northolt such as the blast banks and the diamond shaped roof tiles which each survive at Duxford. Northolt would originally have had a similar roof cladding and the slates and the seven small ridge vents are a secondary replacement. A number of other buildings at Northolt (eg the Mortuary) retain their original diamond pattern tiles. The original metal windows have been replaced at both Northolt and Duxford although those at Duxford match the originals much closer.

4.1.3 Another minor difference is that the bricks at Duxford are common pink Flettons which are found very widely in 20th-century buildings whereas those at Northolt are slightly more localised stock bricks of a type generally found around London.

4.1.4 One area where the Duxford Operations Room has been more altered than Northolt is the internal layout of rooms and in particular a corridor which has been added between the *Signals* and *Wireless Rooms* at Duxford. Gp Capt (Rdt) Lloyd has suggested that this may have been added when the US moved into the building. Original plans supplied by Gp Capt (Rtd) Lloyd have confirmed that the internal layout of Northolt survives closer to its original form than Duxford (see Bibliography).

4.1.5 Another similar Operations Block on which Oxford Archaeology have recently worked is that at Filton Airfield in Bristol. The building's overall form is again very similar to the other Operations Blocks and similarly to Duxford it retains its blast banks and metal framed windows. It also has diamond-shaped asbestos tiles the same as Duxford, without any ridge vents, also suggesting that the slates and vents at Northolt are probably secondary additions. One difference between Filton and the other two Ops Blocks is that it's plant room is in a basement beneath the main building as opposed to in a partially sunken room adjacent to the end of the building. The chimney at Filton is therefore in the main roof ridge unlike those at Duxford and Northolt. Another minor difference is that the block at Filton has two windows at each end unlike Northolt and Duxford which have three windows. With this window arrangement and the fully basemented plant room the Filton Ops Room corresponds more closely to the standard 1161/24 design (Fig. 2) than Northolt or Duxford.

4.1.6 *British Military Architecture* also includes a photograph of another similar Operations Block at Upavon and although it is not known whether the building survives today the photograph, which was taken in 1994, shows blast banks and diamond-shaped tiles to the roof.

5 CONCLUSION

5.1.1 The Operations Block at RAF Northolt is a relatively small, unassuming building of limited conventional architectural merit but it is among the most significant surviving buildings at the airfield. This is partly because it is one of the earliest buildings, dating from c.1925, but particularly due to its use during the Second World War, its historical associations with The Battle of Britain and its function within the worlds first integrated Air Defence System (The Dowding System). Northolt's Operations Room was the airfield's nerve centre and in the Thematic Listing Summary Report it has been described as 'a crucial link in the chain of command which sustained Fighter Command's success in the Battle of Britain'.

5.1.2 Northolt was the headquarters of Sector Z within the 11 Group of Fighter Command and therefore the Operations Room would have been in radio, telephone and teleprinter contact with the other Ops Rooms of the Group as well as radar stations, Observer Corps stations and other organisations. These would have indicated the locations of RAF Squadrons and the Luftwaffe and instructions would then have been relayed from Northolt's commander to the squadrons which were then based at Northolt. The particular interest of 11 Group is that it is most closely associated with the Battle of Britain due to its airfields being particularly targeted (although Northolt was not) and the squadrons based at its airfields being heavily involved in the main fighting.

5.1.3 The particular significance of Building 27 lies in the fact that it formed a prototype for various elements of the air defence system which were perfected in the immediate pre-war period and which proved of such crucial importance in the Battle of Britain. Hornchurch was initially selected as the prototype to test the physical layout of Operation Rooms but it was then deemed too expensive and the Northolt facility (Building 27) was instead used as the model for the other Sector Stations. Gp Capt (Rtd) Steve Lloyd has suggested that this is why the Northolt building can be seen as the 'mother of all sector Ops Rooms'.

5.1.4 The Battle of Britain is clearly recognised as among the most significant phases of the Second World War and as a consequence it is of huge importance in the 20th-century history of the country. The fact that Building 27 is directly associated with the Battle therefore gives it a significance but English Heritage have chosen not to list it (after recommending it for listing at Grade II in the initial thematic survey report). The final report sought the sympathetic conservation and preservation of buildings such as 27.

5.1.5 The withdrawal of this recommendation may be a reflection of the fact that a number of original features ~~have been~~ altered including the removal of the blast banks, the substantial alteration of the Ops Room itself, the re-covering of the roof and the replacement of the windows. In addition it is known that the Operations Room was relocated away from Building 27 during the Battle of Britain in order to protect and maintain the crucial functions of the building and this inevitably lessens, to some extent, the significance of Building 27.

5.1.6 The building has a plain utilitarian character representative of this phase of airfield architecture and in keeping most airfield buildings built during the Trenchard period of the 1920s. Its layout and overall form follows closely the standard layout of a 1920s Operations Block and it is similar to a number of other surviving blocks. Among these are ones at RAF Duxford (Imperial War Museum) and one at Filton Airfield in Bristol which Oxford Archaeology has recently recorded. These other buildings provide useful clues as to the original form of the Northolt Operations Block with blast banks, metal framed windows and diamond shaped roof tiles rather than the secondary slates. In addition the one at Duxford gives a good idea of the historic form and use of the building.

Jonathan Gill
March 2008

APPENDIX I BIBLIOGRAPHY

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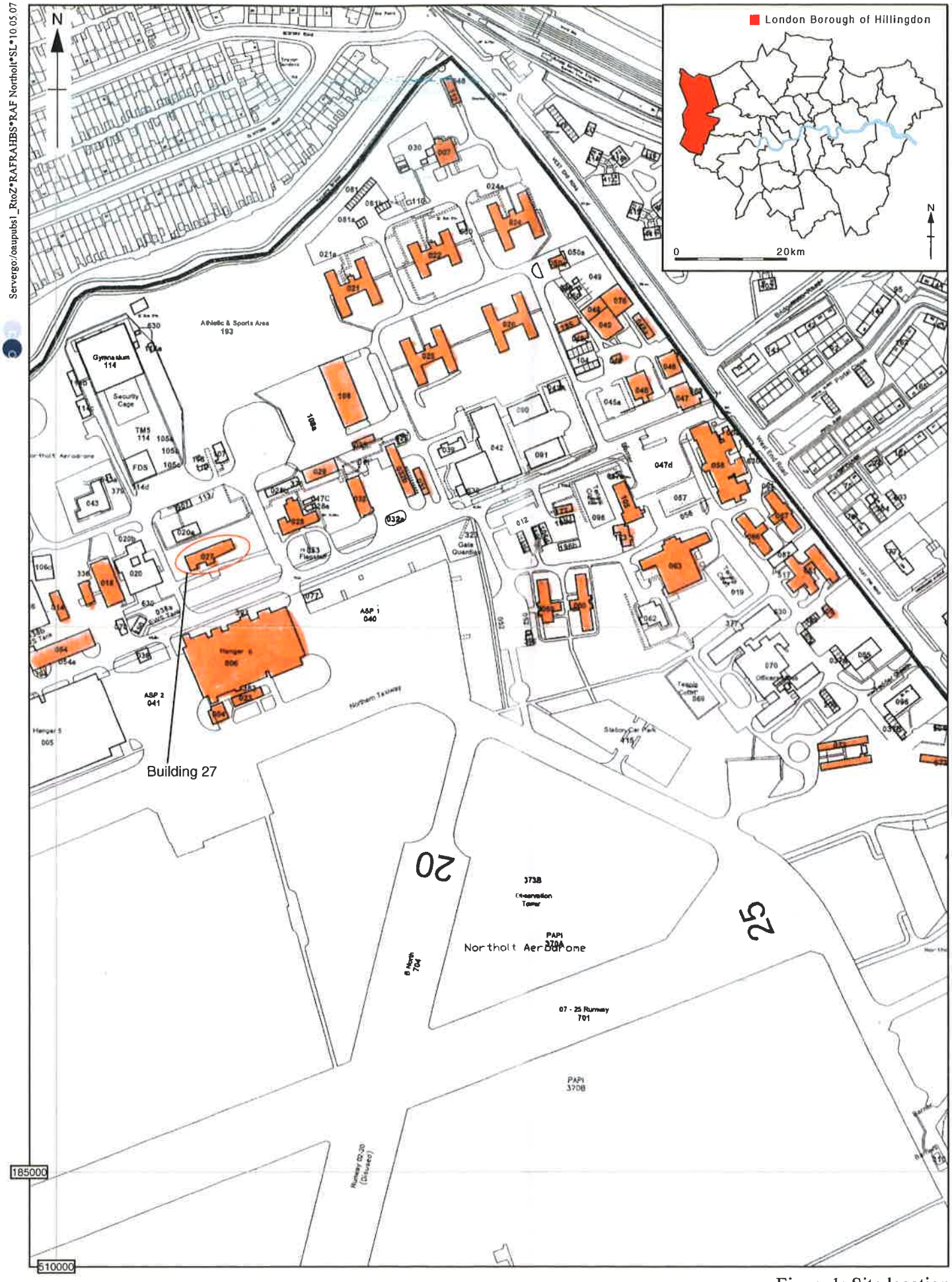
Primary documents

In addition copies of a large number of letters, memos and other documents held at The National Archives and relating to the construction, testing and modification of Operations Rooms between 1928 and 1940 have been supplied by Grp Capt (Rtd) Steve Lloyd)

APPENDIX II SUMMARY OF SITE DETAILS

Site name: Building 27, RAF Northolt, Ruislip, Hillingdon, Greater London
Site code: RAFRAH07
Grid reference: TQ 099 855
Type of evaluation: Historic building recording and investigation
Date and duration of project: April 2007
Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES. It will be deposited with the Museum of London Archaeological Service.



Scale 1:3,500

Figure 1: Site location

Data provided by *Defence Estates*

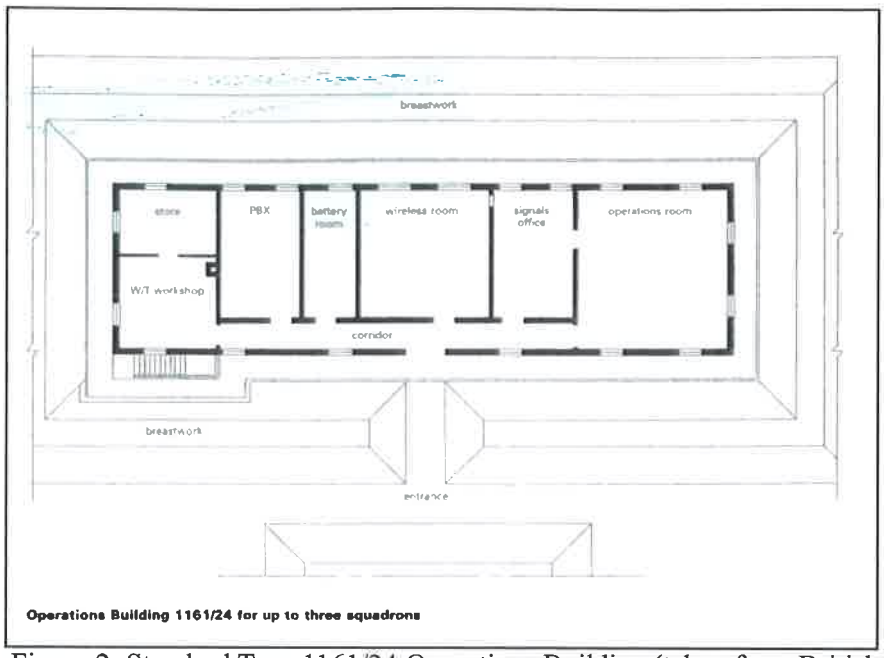


Figure 2: Standard Type 1161/24 Operations Building (taken from British Military Airfield Architecture by Paul Francis)

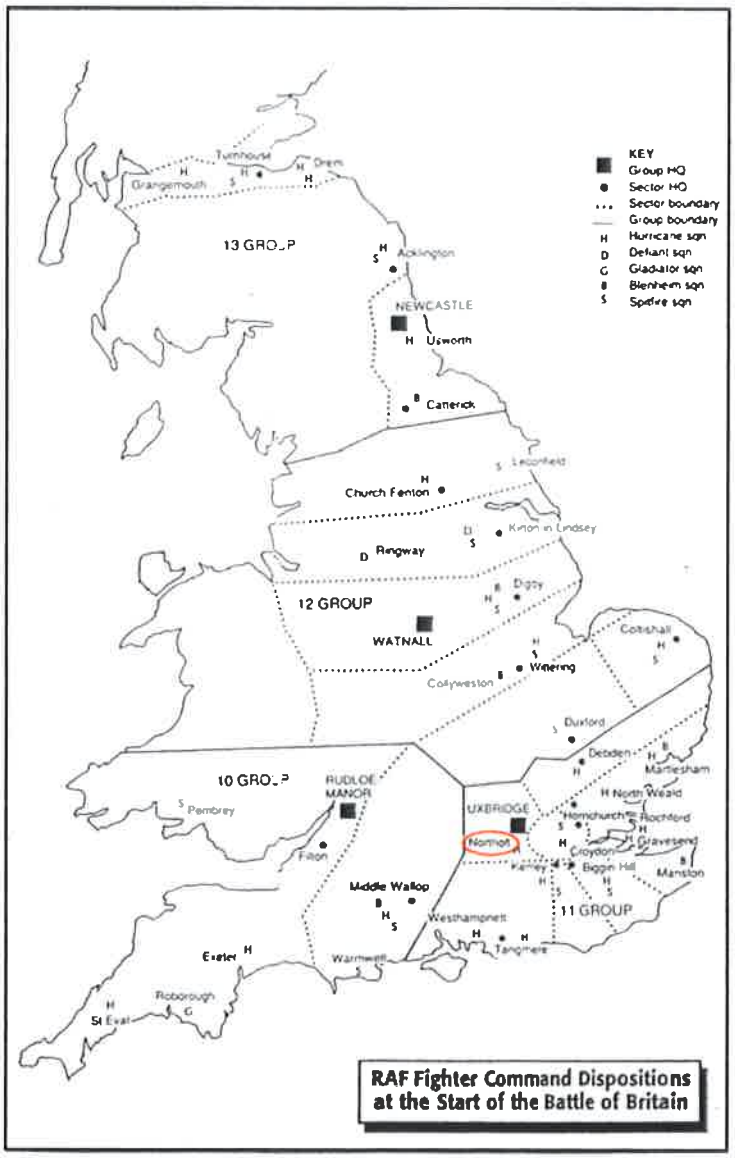


Figure 3 : Fighter Command Dispositions at the Start of the Battle of Britain (taken from John Ray, The Battle of Britain: New Perspectives)

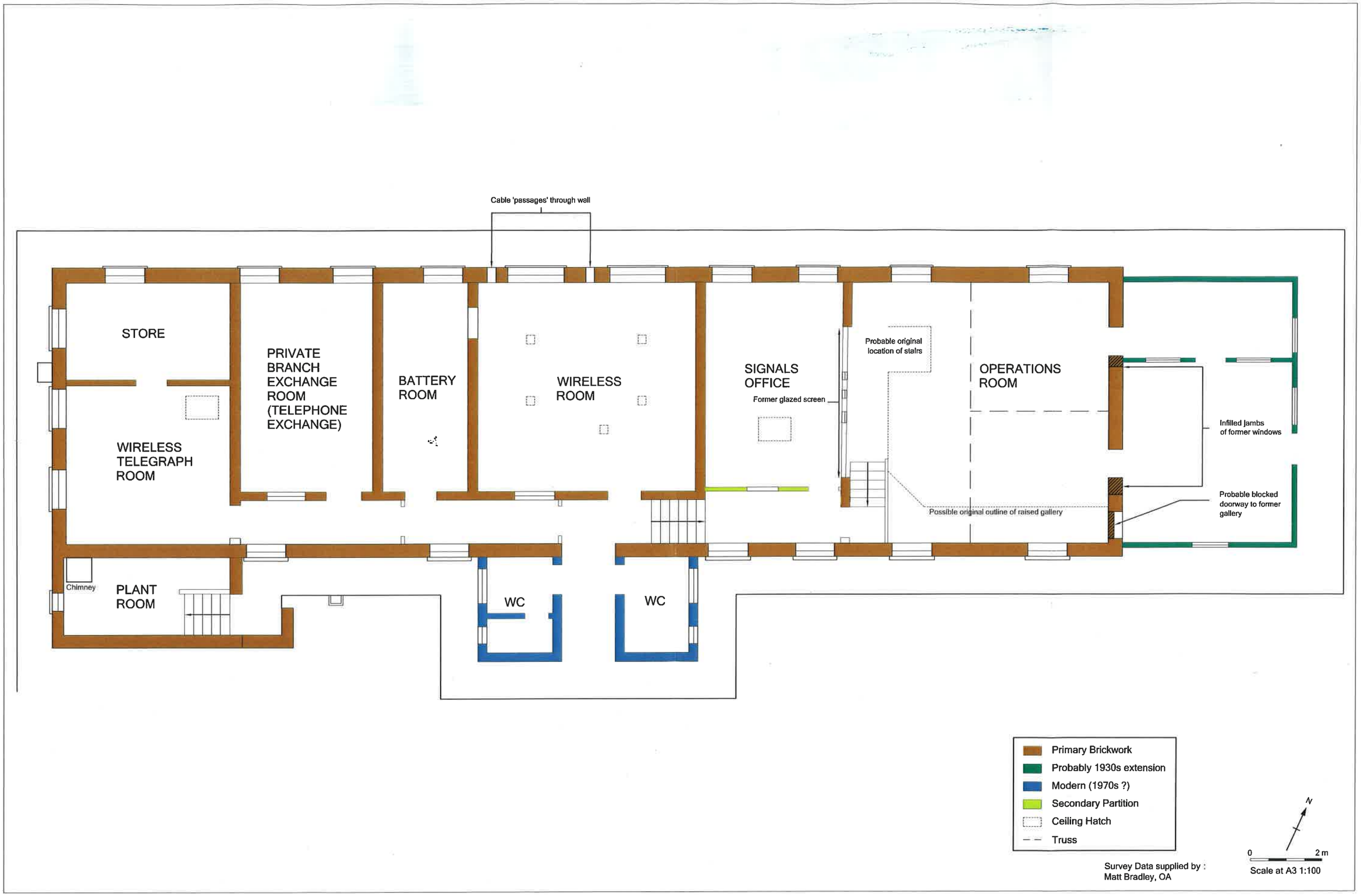


Figure 3: Plan of Operations Block (Building 27)

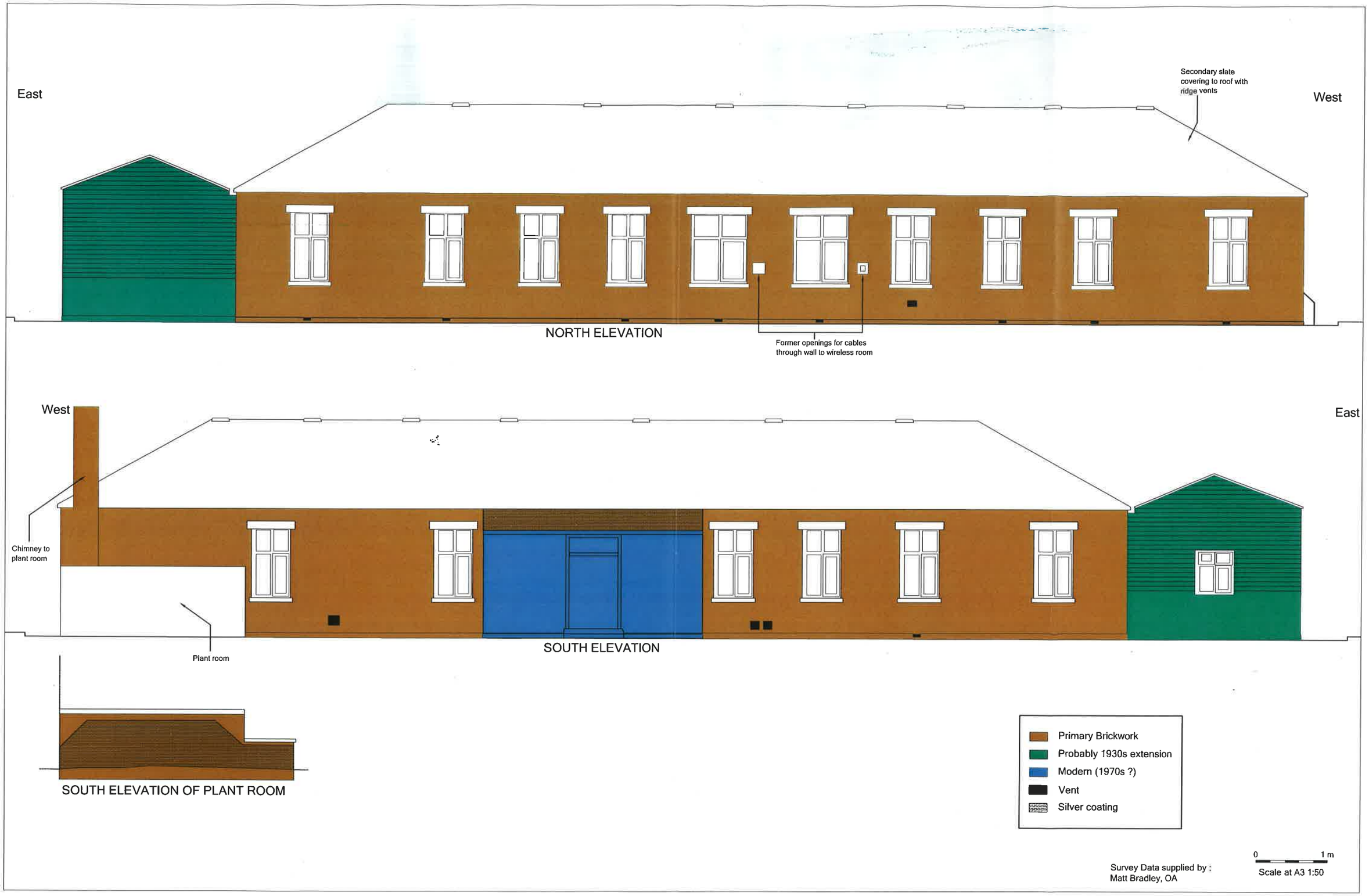


Figure 4: North and south elevations

W:\Projects Ongoing\Northolt\010Geomatics\CAD\001current\RAFRAHBS_RAF Northolt Building 27_east and west elevation 100507.dwg(Figure 5)*RAFRAHBS*RAFRAHBS*RAF Northolt*matt.bradley* 17 Ma

North

South

EAST ELEVATION

South

North

WEST ELEVATION

Primary Brickwork
Probably 1930s extension
Silver coating

Survey Data supplied by :
Matt Bradley, OA

0 1 m

Scale at A3 1:50

Figure 5: East and West Elevations

Plate 1: General view from north-east

Plate 2: North elevation of 1930s extension

Plate 3: East elevation of 1930s extension

Plate 4: General view from south-east

Plate 5: General view from south-east

Plate 6: General view of section of south elevation

Plate 7: Plant room at west end of south elevation

Plate 8: Plant room showing outline of former blast bank and concrete 'shield' around stop cock

Plate 9: General view from south-west

Plate 10: West elevation

Plate 11: General view from north-west

Plate 12: Central section of north elevation

Plate 13: Walkways at north-west corner of building

Plate 14: Cable opening in north elevation

Plate 15: Ventilation hole in north elevation

Plate 16: Stairs in corridor

Plate 17: Former wireless telegraphy workshop

Plate 18: Former PBX room

Plate 19: Former wireless room

Plate 20: Truncated cable in ceiling of wireless room

Plate 21: Hatch in ceiling of W/T workshop

Plate 22: Internal window in former PBX room

Plate 23: Corridor along south side of building

Plate 24: Internal window in former wireless room

Plate 25: Hatch in former battery room

Plate 26: Former signals room

Plate 27: Former Operations Room

Plate 28: Former Operations Room

Plate 29: Roof of former Operations Room

Plate 30: Stairs (probably relocated) in Operations Room

Plate 31: Probably blocked doorway at SE corner of building

Plate 32: Extension at East end of building

Plate 33-36: Photographs of features relating to communication network
(provided by Group Captain Steve Lloyd RAF Retired)

Plate 37: Roof structure (provided by Group Captain Steve Lloyd RAF Retired)

Plate 38: Operations Room at RAF Duxford during World War II (provided by Group Captain Steve Lloyd RAF Retired)

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