The
NATIONAL AND INTERNATIONAL VALUE
of BLETCHLEY PARK

A PLATFORM FOR DISCUSSION
and its future

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Introduction

Bletchley Park is globally renowned for the achievements of its codebreakers, and for their contribution to the outcome of the Second World War, the development of the modern computer and associated achievements in a whole range of subjects from mathematics to linguistics. Its evolution from a cryptographic research centre into a global signals intelligence (SIGINT) hub, in addition to underpinning its wartime success, shaped the development of SIGINT as a vital contributor to the global mission of Britain and its allies in the Cold War period and beyond. The site was designated as a Conservation Area in February 1992. The main house and the stable yard buildings are listed at grade II, but in 1993 the wartime structures were rejected for listing and in 1999 the site was not included by DCMS on the shortlist for UNESCO UK world heritage sites. All these decisions reflected uncertainty concerning the degree to which the landscape and surviving fabric at Bletchley Park provided a tangible reflection of its role and contribution to the outcome of the Second World War and the birth of the Information Age. The lack of an informed understanding of the character of the site, embedded into the wider master planning for the regeneration of the area, has also in the past presented obstacles to an agreed approach by the site's many stakeholders to sustainable development proposals and funding options.

Home at its peak to nearly 10,000 people, and now located midway between the Oxford-Cambridge technology arc, Bletchley Park has rich potential to build on its rich past to inspire current and future generations to innovate and bring forward new technologies and innovations. It can thereby contribute to the economic and social well-being of the Bletchley area, one of a number of Sustainable Communities projects being developed by English Partnerships, and also the wider Milton Keynes conurbation, identified by ODPM as the target area for approximately 70,000 homes over the next generation. This is now being progressed through a Masterplan, commissioned by English Partnerships from EDAW consultants, which will examine options for a diversity of development scenarios within a flexible framework linked to the wider planning of the area.

It is, however, only now following considerable research that it is possible to understand more fully how this significance is reflected in the surviving fabric at Bletchley Park, and to begin to provide guidance as to how this fabric might be protected and interpreted for the benefit of future generations. English Heritage initiated discussions with the Bletchley Park Trust late in 2002 which resulted in the co-funding of an initial documentary-based survey by Dr David Evans, and in September 2003 a survey team from its Cambridge office commenced a comprehensive survey of its fabric and landscape. This paper, which has been drafted by Jeremy Lake of Characterisation Team, is a distillation of this research that sets the results of this documentary and survey work within its broader historical context. This has benefited from contributions by Fleur Hutchings, the author of an award-winning thesis submitted to the University of Brandenburg in February 2003, and GCHQ, who have been preparing and cataloguing Government Code and Cypher School (GCCS) papers for release to the National Archives at Kew. This Values paper, which accompanies a draft contribution to the

Conservation Management Plan now underway, aims to inform the key stages of the Masterplan process through providing a platform for:

- an agreed understanding of the overall cultural values, context and historic character of the Bletchley Park site as a whole;
- informing consideration of the extent to which surviving fabric and landscape both informs and reflects these key values;
- ensuring that the cultural value of the site is thus fully appreciated and understood, prior to the consideration of other key issues, such as the capacity for change of individual structures, their condition and their viability for reuse.

It is also informing consideration of how Bletchley Park's significance can be recognised through statutory protection, through its inclusion as a pilot in the Designation Review.

A summary history of the site is followed by an outline of the key values associated with the site. These have been broken down into separate headings, falling into the categories of historic, scientific, political and regional:

1 *Historical:* Bletchley Park's contribution to victory in the Second World War
2 *Historical:* Bletchley Park's contribution to the development of Signals Intelligence
3 *Scientific*: Bletchley Park as the birthplace of the Information Age
4 *Political:* Bletchley Park as the catalyst of International Relations
5 *Regional:* Bletchley Park's relationship to the locality and region

These values have then been examined in relationship to the site as a whole, and in the component parts of its landscape and fabric, under the following headings:

- *International Significance.* Signals Intelligence (SIGINT)
- *International Significance.* The Information Age
- *National Significance.* As a country house and its associated park which has been adapted for wartime use

2 History

Summary History of the Site

Bletchley Park lies to the east of the medieval village of Bletchley, and in the medieval period comprised an estate with a deer park, a fish pond and a house. In the early 18th century a house with flanking wings and pavilions (to the east of the present mansion) had been erected for the noted antiquary Dr Browne Willis. The principal features of the garden were the present lake (adapted from a medieval fish pond) and avenues of lime trees on the cardinal axis of the site, the southern avenue surviving as Wilton Avenue. The house was demolished in the 1790s, and following the purchase of Bletchley Park in 1883 by Sir Herbert Leon, a prominent financier, the estate was expanded and provided with a home farm, ornate gardens, a recreation ground and cricket pavilion, entrance lodges and cottages. The mansion, which dates from the 1870s, was transformed with an opulent new south front and lavish interior in the eclectic Domestic Revival style. The Leons added extensive tree planting to the east of the site, extending to the present railway, and employed the local architect Edward Swinfen Harris to extend the stable yard buildings. The 581-acre estate was split up after the death of Lady Fanny Leon in 1937. The core 58-acres around the mansion was then purchased in 1938 by the British Government as a new dispersal location for the Foreign Office's Code and Cipher

School (hereafter GCCS) and Secret Intelligence Service (SIS, later MI6), from their Broadway HQ in London.

The GCCS had been established in 1919, around a core of expertise developed in the army and navy, to gather intelligence from all available sources including wireless transmissions, to study the methods of cipher communication used by foreign powers and to advise on the security of British codes and ciphers. By 1939, when it had access to the diplomatic codes of 26 countries, the linguists and classicists – such as John Tiltman, Dilly Knox, Hugh Foss and Frank Birch– that formed the core of its expertise had been joined by men and women recruited from industry and other branches of academia. These included the mathematican Alan Turing, who had published his famous work on 'Universal Computing' in 1936, five years before he was approached to join the ranks of Bletchley Park. His early work on the Enigma code, including the development of the bombe analytical machines with the mathematician Gordon Welchman, was crucial to the successes of Bletchley Park. His ideas on computer technology, and those the team that developed machines to assist in the breaking of the Lorenz teleprinter code (culminating in the Colossus computer), were to have a profound impact on computing developments after the war. Many other figures – such as Harry Hinsley, the author of the official history of British Intelligence, who became a major figure in Hut 4 - went on to achieve eminence in academia, political life and industry after the war, and some played a key role in the development of GCCS's successor, GCHQ.

The establishment, development and continuity of intelligence production on the same site during the Second Word is *the* major factor which, alongside this collective brilliance of minds, contributed to Bletchley Park's wartime development, surviving character and global significance. It developed from a small community of specialist cryptographers into a vast and complex global SIGINT factory by early 1943, although its growth did not peak until January 1945, when staff numbered nearly 9,000. The construction of timber huts, the first of which were fitted out as shells by September 1939, marked Bletchley's first phase of expansion out of the pre-existing fabric offered by the mansion and associated structures. These fell into two categories: prefabricated structures (often taken down and resited) and more permanent wooden huts, constructed from Canadian pine with external covering of shiplap boarding or asbestos cladding. The first plans for more permanent brick blocks, largely modelled on Ministry of Works Temporary Office Block designs but individually planned in consultation with GCCS staff, were drawn up in July 1941, their completion stretching over a two year period from early 1942 to September 1944. These included accommodation for the burgeoning signals intelligence sections, in addition to the expansion of housing for the communications sections and the site's unique assemblage of analytical machines.

In 1946 GCCS, renamed GCHQ after the Second World War, left Bletchley for a new headquarters in Eastcote, north London, and then in 1953 to its present location in Cheltenham. The top secret work of the codebreakers of GCCS was first revealed to the public with the release of Fred Winterbotham's book, *The Ultra Secret* in 1974. It was not until 1992, in reaction to proposed demolitions of the wartime fabric, that a trust was formed and the site designated as a conservation area. The mansion is now the headquarters of the Bletchley Park Trust (as reformed in 2000), although with the exception of the stable yard buildings and Blocks A, B and H, the principle wartime fabric is unused and in a rapidly deteriorating condition.

3 Key Values

1 *Bletchley Park's contribution to victory in the Second World War.* The intelligence produced by Bletchley Park built a comprehensive picture from which a wide range of conclusions could be drawn, from enemy activity to high-level strategy. The contribution of its codebreakers to the outcome of the Second World War is now globally renowned, particularly important being:

- its decisive contribution towards the defeat of the U-boats in the Battle of the Atlantic;
- its contribution towards air defence (for example in the identification of the beam guidance system for German bombers, a considerable aid in defence against night bombing in early stages of war) and the air offensive against Germany and targets in occupied Europe;
- its contribution towards the Mediterranean and North African campaigns, the latter including Alamein;
- the launch and success of Operation Overlord, including the disposition of German defences and the role played by the breaking of the German secret service Enigma in the Double Cross operation that misled the Germans as to the intended target for the invasion of northern France;
- the identification of new weapons including Germany's atomic research, their V weapons, jet aircraft and the development of new U-boats;
- analysis of the war on the German economy, such as the effectiveness of attacks from late 1944 on German oil supplies;
- the breaking of Japanese codes, of particular importance in revealing through diplomatic traffic the disposition of German defences prior to Overlord;
- through liaison with the US SIGINT authorities, the final defeat of the Atlantic U-boat packs and outcome of the war in the Pacific.

2 *Bletchley Park and Signals Intelligence.* BP became a world leader in the development of Signals Intelligence, which developed in the 20th century as a vital tool for enabling governments to gain a picture of the intentions and actions of foreign powers. It embraced many key functions other than code breaking, for by the First World War many armed forces, and in the course of the conflict the Royal Navy in particular, were utilising developments in cable, Morse and wireless communications. During the inter-war period fresh challenges to the tasks of radio intercept stations and cryptographers were posed by developments in encoding machinery and high-speed teleprinter transmissions (each producing in turn the Enigma and Lorenz machines). It was at Bletchley Park, more than any other site in the world, that process-flow and production-line methods were consistently applied to the key stages of receiving, codebreaking, evaluating, processing and disseminating data. Its success was underpinned by close inter-service liaison and, in the words of a leading American cryptographer (William Friedman), a working culture where 'rank or status cuts no ice'. This development of SIGINT, a term which developed into its modern usage in 1943, shaped the future structuring of intelligence gathering by Britain and its allies for the remainder of the Second World War, the Cold War and beyond.

3 *Bletchley Park as the birthplace of the Information Age*. The theoretical foundations for the modern computer, and its practical application for business, intelligence and defence purposes, were laid in both Britain and the United States in the 1930s and 1940s. The site bears witness to the first time in history that, spurred on

by the exigencies of war, digital technology was harnessed on a systematic basis to the production of information as a commodity.

- In contrast to the university-based research that sustained many developments in Britain, Germany and the US, the machines developed at Bletchley Park were production not research models, applied instantly (and subsequently adapted) to the purpose for which they were intended.
- Bletchley Park became the hub of a huge communications network that extended through the British Empire and beyond, utilising the world's largest cable-network and a series of radio stations (the 'Y' service) for the interception of the encrypted radio transmissions of foreign powers.
- The ever-increasing challenges facing the codebreakers at Bletchley Park were both the operating procedures used for Enigma, capable of 150 million million million combinations, the massive growth in intercepted traffic as the theatre of war expanded and the introduction of the high-level Lorenz teleprinter code late in 1941.
- These factors provided the impetus behind the development at Bletchley Park of a remarkable range of deductive techniques aimed at finding the daily Enigma and Lorenz settings, and analytical machines whose task was to speed up the task of code breaking. The latter comprised the use of Hollerith machines, in use by business and governments since the 1890s and particularly valued in the breaking of Naval Enigma, the development from late 1939 under Turing and Welchman (and the engineering team headed by Harold (Doc) Keen) of the electro-mechanical bombe machines and from 1942 of the valve-powered Robinson and Colossus machines under Max Newman and Tommy Flowers of the Post Office, designed to speed the decryption of the Lorenz code (codenamed Fish). Colossus II, delivered in June 1944, vies with the US Ordnance Department's ENIAC machine, developed in part to project trajectories and calculations for the atomic bomb but not completed until 1946, for the distinction of being the world's first programmable electronic computer.
- Post-war developments, leading to the development of the modern computer as a machine for the making of calculations based on the storage and analysis of information, built on the concept of a universal computing machine and artificial intelligence, as published by Turing in 1936, and John von Neumann's work (published in 1946, and building on his experience with ENIAC and the Manhattan Project) on the concept of stored program machines. Although the post-war partnership between the National Security Agency (NSA) and commercial companies such as IBM was more successful than in its British counterparts, it is important to note that many key figures at BP made significant contributions to future computing research – such as Turing and Max Newman's contribution to the Manchester 'Baby' and Mark I computer, Gordon Welchman to the US MIT Whirlwind project, Tommy Flowers and his Post Office team to air defence and control and the foundation of the first university chair (by Donald Michie) in Artificial Intelligence and the Turing Institute at Edinburgh University. Also deserving mention is the impact of Bletchley Park, and specifically the management styles developed by key figures such as Newman, on informational management in the post-war period.

4 *Bletchley Park's Contribution to International Relations.* Bletchley Park became an important catalyst in the initiation of international co-operation both before, during and beyond the Second World War, as a result of:

- early co-operation with France and particularly Poland in breaking the Enigma code collaboratively. BP's initial success in the decryption of Enigma owed much to the evidence handed over to the representatives of GCCS by Polish codebreakers at a meeting in Pyry on 26th July 1939, and subsequent liaison with Polish cryptographers at their bases in France. These included hand techniques using perforated sheets and the workings of the Polish Bomba, an analytical machine devised in order to speed up the process of decryption.
- agreement between GCCS and the US SIGINT authorities, marking the first time in history that intelligence expertise and technology had been exchanged between foreign powers. Agreement with the US Navy's OP-20-G, finalised as the Holden agreement on naval SIGINT in October 1942, was centred on the need to break back into the Shark U-boat code and GCCS assistance to the US Navy in the development of 'analytical machinery' – particularly the bombe machines and their variants, built by both IBM and the British Tabulating Machine Company. Agreement between GCCS and the US Army was finalised as the BRUSA agreement in May 1943. Brusa's world-wide network linked Bletchley to other major intelligence centres at Washington, Guam, Pearl Harbour, Colombo, with to Melbourne. Tiltman, Turing and other key players at BP also visited their US counterparts in Washington and the manufacturers of bombes and other machines at the National Cash Register Plant (builders of ENIAC) and elsewhere, helping to smooth the waters for the exchange of information and expertise. This collaboration in Signals Intelligence characterised the post-war co-operation between GCHQ and NSA that played a significant (and as yet untold) part of the post-war transatlantic alliance, now heavily focused in the war against terrorism.
- the Control Commission for Germany, established here after the war in Europe, became a model for subsequent control schemes for later wars.

5 *Bletchley Park's relationship to the locality and region*

Post-war development makes it difficult to appreciate the rural location and nature of the Bletchley park estate. Besides the site's relationship to the medieval church and village to the south west, recent fieldwork has revealed the extent of the former medieval deer park and the location of the demolished early 18th century house. Bletchley itself witnessed increased development after the building of the railway station in 1838, including the development of estate buildings for the Leons after 1883, but it was the sale of the estate in 1937 which prompted the residential development of the area around the present park, including some of the 'semis' that line Wilton Avenue. Its setting, once largely rural in character, has thus become increasingly residential, a process that has accelerated since Bletchley's incorporation into the new town of Milton Keynes in 1967. Wartime Bletchley Park, besides acting as an information hub, required outstations for its bombes (at Adstock Manor, Gayhurst Manor and Wavendon House, and further afield at Stanmore and Eastcote in north west London). Whaddon Hall, another nearby country house, served as the Secret Intelligence Service's main wireless traffic communication centre, and regularly liaised with Bletchley Park (particularly its Codes Section). The need to accommodate, transport and cook for the thousands of staff that worked on the site, and maintain and build its fabric and infrastructure, drew on the resources of the locality and region. In addition to the billeting of staff in pubs, hotels and private homes, camps and dormitories in the area were built to house military personnel, naval Wrens accommodated in local country houses, and civilian women personnel accommodated in

dormitories to the east of Wilton Avenue. Cycle racks catered for local workers, and an on-site transport section (with garages and facilities for drivers) reflected the need for a complex transport system with timetables organised around day and night shifts. In 1942, a new canteen and assembly hall on Wilton Avenue (both of which survive) were built as part of the rebuilding of the site that continued into 1944. Bletchley Park had a diversity of post-war uses: as the training school of the Control Commission to police and monitor post-war Germany (which formed the precedent for subsequent control schemes), for GCHQ staff, a teacher training college and the Radar Training Centre for the Civil Aviation Authority (1948-1993), the General Post Office and British Telecom.

Values that are key to unlocking the potential of the site
The significance of Bletchley Park would indeed seem to suit commercial investment and development opportunities better than many heritage sites, with its values so very much entrenched in scientific achievement and cutting-edge technology of the time. *Educational* The great potential for Bletchley Park to communicate the link between human thinking (as exemplified by the achievements of the code breakers) and the creation of the computer - the most significant technological development of the 20th century – played out against major world events. *Economic and Social* Great potential to bring social and economic regeneration to the local community. Allowing Bletchley to brand itself in the wider world on several fronts including the growth of Milton Keynes. *Associational* Bletchley Park's fame has resulted in both a sense of pride by the local community and the country at large. *Research* An opportunity exists at Bletchley Park to provide an international archive based on the development of war and peacetime intelligence and computer technology developed principally at Bletchley Park and in Europe and the USA, that will aid collaborative research work undertaken by Universities.

4 Landscape and Fabric

What survives (see plan of site) bears a very strong and direct relationship to the values outlined above. This issue will now be examined in relationship to:

- *the overall character of Bletchley Park, the scale and grouping of surviving buildings, their response to the landscape and contribution towards the site's special atmosphere and sense of place;*
- *the external form, internal planning and detail of individual structures.*

The continuity of Ultra production on the same site (as has been noted above) is what makes Bletchley Park unique in an international context. All stages of the attitudes and advances made in cryptographic, computing and intelligence processes are visible in the surviving fabric and park, from the mansion, stable yard and associated park to the timber huts and the later brick, steel and concrete structures. At a superficial level, the huts and blocks (the latter based on Temporary Office Block designs) were used on many wartime sites, including the 5 bombe outstations and the sites occupied after the war by GCCS's successor, GCHQ Cheltenham. All

the wartime huts and blocks, however, were specifically planned and adapted for their wartime purpose, the latter in close consultation with Ministry of Works architects. Taken as a whole, the landscape and infrastructure of Bletchley Park survives as a unique surviving embodiment of the following:

1 *International Significance.* The most intact example in the world which reflects the formative development of decryption and intelligence organisation into modern-day Signals Intelligence (SIGINT) in particular the management and processing of data, which developed during the Second World War, played a major role in the Cold War and are highly relevant today. In the Second World War, the most valuable intelligence called for the integration of interception, traffic analysis and cryptanalysis, and its success was dependant on the collaboration of a broad range of business and academic disciplines, including those of radio engineers, mathematicians, linguists and the designers of electro-mechanical decryption machines. The diverse strands of signals intelligence in Britain were, uniquely in a global context, brought together on one site (Bletchley Park).[1] Other countries' intelligence gathering operations, as in Germany and America, existed in a state of rivalry and dispersal.

The layout and internal planning of surviving buildings, which display both the need to compartmentalise and speed the process flow of its diverse functions, provides a direct and tangible link to GCCS's evolution into a global SIGINT hub. There are 3 stages of development.

	FUNCTIONAL DEVELOPMENT	FABRIC
1	An organisation centred on the relatively isolated work of a group of scholars, initially focusing on code breaking (using traffic analysis and the decryption of encrypted messages intercepted by the 'Y' service radio stations) and intelligence analysis.	Pre-existing fabric was utilised in this phase, most importantly the mansion, the buildings around the stable yard and Elmers' School (since demolished). The sheet production system was set up under Dilly Knox in The Cottage, where Turing also worked, and Gordon Welchman. These sustain the first breaks into Enigma, in early 1940. See 5.1.
2	A production-line system developed from late 1939, under Gordon Welchman and the Assistant Director Edward Travis, for the analysis, interpretation and communication of decrypted messages (codenamed ULTRA) to appropriate Commands, Ministries, or field officers throughout Europe, North Africa, the Atlantic and beyond. This process-flow system was based upon: - the setting up of a 24-hour rota system, initially based on the realisation by Welchman that the starting positions and wheel orders on the Enigma machines were only changed every night at midnight. It followed that, if the base settings could be broken on any message, then every message intercepted over the ensuing 24 hours could be decrypted.	The application of process-flow and production-line methods, in compartmentalised working areas, is graphically displayed in the planning of the most critical huts, 3 and 6 (for the decryption and evaluation of Enigma army and air force traffic) standing in close proximity and 4 and 8 (for the decryption and evaluation of Enigma naval traffic) being separated at some distance. Each of these working units, which continued to be referred to under their Hut names after the move into the Blocks, thus formed discrete working compartments that were controlled (from the mansion) at a high level in the organisation. These huts survive in close proximity to the mansion, with some of the internal planning relating to the operation of signals intelligence intact. Hut 8 retains the 'Big Room' for the breaking of Naval Enigma at its

[1] The two minor exceptions were Communications Security (the production of codes) which moved to Mansfield College in Oxford, and the removal of the Diplomatic Section to London in early 1942 (Information from GCHQ).

	- a division of the most important tasks into two pairs of huts, namely Huts 8 and 4 for the decryption and evaluation of Naval Enigma and 6 and 3 for the decryption and evaluation of Army and Air Force Enigma. The final stage of evaluation was the responsibility of the tri-service Advisors and finally the Duty Officers who worked, in close liaison with the Indexes, in and around the Watch rooms of Huts 3 and 4.	north end, and Hut 3 retains the layout of its Index and Watch rooms, the latter where the final critical stage of evaluation took place. Hut 6, under its head Gordon Welchman, and Hut 8 under Turing develop the bombe. Turing led decryption of naval Enigma, its complexity calling for close collaboration with bombe and Hollerith machines, the devising of further ingenious codebreaking methods and the capture of code books from enemy trawlers and submarines. See 5.2.
3	The period from May 1940 was characterised by a massive increase in the volume and complexity of the traffic, due to the widening of the theatre of war. Further complications were the introduction of the enciphered teleprinter code (codenamed Fish) of the Lorenz machine, introduced with the invasion of the Soviet Union in December 1941, and more variants on the Enigma machine which included the 4-rotor U-boat Shark key (imposing a blackout for much of 1942). In reaction to this and the need to create more direct links between GCCS and the operational commands, the Y intercept stations were massively expanded and moves made to better integrate the roles of cryptanalysis, intelligence and traffic analysis, and develop liaison between the services and the US Sigint authorities.	The final block phase of building, following a Chiefs of Staff decision in July 1941 (given added urgency by Churchill in October that year) to bolster the British Signals Intelligence effort, reflects the pressures of an epoch of total war. Their construction, not completed until September 1944, marked the Allies' transition from defensive to offensive military operations, including the bomber offensive, the break-out from North Africa and preparations for the invasion of Europe. Their internal planning, the result of consultation between GCCS and the Ministry of Works architects, directly reflected the continuation of linked but compartmentalised working practices pioneered in the construction of the huts. The fusion and integration of Signals Intelligence is most clearly seen through the planning of Block D which came into operation in February 1943 as the new home of Huts 3, 6 and 8, together with the traffic analysis sections brought to BP, and the inter-service and US liaison units. Parts of the internal wartime planning of Block D have survived, including the critical working hub of the Watch and Index sections. The Communications Section buildings (E Block and teleprinter rooms) undergo continual extension and modification as traffic increases. See 5.2 and 5.4.

2 *International Significance.* The only site in the world which has a range of structures relating to the birth and formative development of the Information Age, from 19th century punch-card machines to the first programmable computers. Bletchley Park, despite some demolition, has retained a unique surviving assemblage of buildings whose planning and developing scale is a direct reflection of GCCS's development of technology on the cutting edge of international developments in the field. The structures, outlined in detail in 5.3, relate in sequence to:

	FUNCTIONAL DEVELOPMENT	FABRIC
1	The development by Alan Turing and Gordon Welchman of a highly sophisticated electro-mechanical device named the	The first application of analytical machines to code breaking is

	bombe, inspired by the Polish bomba. The bombe used mathematical techniques (specifically algorithmic) in order to speed up logical deductions made off-line concerning the settings on the Enigma machine plugboard and the wheel order within the machine. Orders placed late in 1940 for the mass production of bombes resulted from early 1941 in the construction of larger buildings at Bletchley Park and their accommodation in outstations linked to the site. Later in the war more powerful models were developed in close partnership with the Americans.	reflected in the accommodation of the first generation bombes in the small Hut 1. The brick-built Huts 11 and 11a are built to a larger scale, reflecting the decision to initiate mass production in addition to the more even temperature-controlled environments that such machines required for reliable functioning.
2	The Hollerith machines, an electro-mechanical device developed by Herman Hollerith in the late 19th century, which could analyse information fed to it by punched cards. The latter owed much to the system developed by Jacquard in 1805 for the automation of weaving looms, and were modelled on Charles Babbage's Analytical Machine of 1833. The Hollerith, first used for the 1890 US census, was built under licence throughout Europe (including the Soviet Union) and was in limited use by US and British intelligence services by the late 1930s. As supplied by IBM to the German government, these machines also became a key part of the logistical operations of the Third Reich including the Holocaust. Tabulating equipment was first installed in Hut 7 in March 1940, providing additional resources for the codebreakers in Huts 6 and 8, and from late 1942 was moved to Block C. These machines were continually (and secretly) experimented upon and adapted, and used highly sophisticated arithmetic techniques in order to hunt for matching groups in matching relationships amongst the volume of intercepts. The Bletchley Hollerith section, utilising IBM machines manufactured under licence in the UK by the British Tabulating Machine Company, was studied by the Americans and used as the model for the establishment of similar but larger plant developed for their SIGINT authorities in Washington.	The massive scale and bespoke planning of C Block (which in October 1942 succeeded to the demolished Hut 7 as the Hollerith machine building) directly relates to the fact that it housed what was one of the largest assemblages of these machines ever grouped together, and which comprised a model for their development by the US Sigint authorities. All the Hollerith machines used by GCCS were stored at Bletchley Park[2], and serviced by staff from the British Tabulating Machine Company. Although a tried and tested technology, the continual and secret adaptation of these machines is a little appreciated aspect of Bletchley Park's contribution to the development of the modern computer.
3	A sequence of machines developed in order to speed up the breaking of the high-level cipher (codenamed Fish) of the Lorenz teleprinter machine, introduced with the invasion of Russia in December 1941 and first broken by hand at BP. A close working relationship with Post Office engineers, most notably Tommy Flowers, was established by Professor Max Newman and Ralph Tester. They headed experimental units christened the Newmanry (which researched cipher settings) and the Testery (which researched and produced decodes). This led to the development of a remarkable simulation of the Lorenz machine, named the Tunny machine, and the 'Robinson', as specified in January and delivered in June 1943, culminating in the production and completion (January 1944 for Mark I, June 1944 for the more powerful Mark II) of the valve-driven Colossus machine. This was the world's first programmable electronic computer.	F Block, which housed at its south end the Newmanry and Testery (including the earliest housing for the Colossi computers and related machines), was demolished in 1988. However, the accommodation of these machines found direct reflection in the large scale and plan of H Block, which still survives as the world's first purpose-built computer room.

[2] The principal role of the Hollerith outstation at Drayton Parslow, established in August 1941, was to serve the Cypher Construction Service at Mansfield College, Oxford.

3 *National Significance.* A unique surviving example of a country house and its associated park which has been adapted for wartime use. The structures now – as a result of demolition and alteration elsewhere - have great rarity as a wartime office site, and survive as a uniquely important and complete assemblage representative of developments at the many hundreds of country homes requisitioned for use during the Second World War.[3] They are all set within the context of the earlier park, the remains of which extend out to the former medieval deer park to the north and the tree-lined avenue shown on 18th century maps (now Wilton Avenue) to the south. It is significant to note that the mansion and the huts all relate to the N-S axis shown on early 18th century estate surveys. All of the wartime fabric is intermixed with a rich mix of tree planting, extending from 18th century limes to an abundance of late Victorian trees. The area of the park in front of the mansion conveys the strongest sense of Bletchley Park's wartime use and atmosphere. Here the pre-existing fabric (the mansion and stable yard, including The Cottages) can be appreciated and seen in clear visual relationship to Hut 4, the Huts 11, 3, 6 and 8 group and Blocks A and B, in addition to the tennis courts, grassed area and lake (the former medieval fish pond) which provided an important recreational and contemplative setting for the staff. The mix of wartime structures and the earlier country house landscape and architecture at Bletchley Park directly relates to the mix of formality and informality that features strongly in published testimonies. GCCS's success, on the one hand, was underpinned firstly by strict rules regarding security, the division of its workers into secure compartments and a great deal of routine work – most notably by the naval Wrens, a large number of whom operated its bombe machines. On the other hand, Bletchley Park was also characterised by a distinct lack of formality and a toleration of eccentricities that fostered creativity and inventiveness amongst its core professional staff. The essential backdrop to wartime Bletchley Park was the mansion and its park, the nucleus of the Leon estate which contributed to the country house atmosphere which features strongly in published memoirs of wartime Bletchley. The mansion was in every respect the iconic structure of the site, serving as the headquarters building for its senior staff, for meetings with American and other partners and as the restaurant for its staff until 1943.

5 Assessment of Surviving Fabric[4]

There has been some wartime and post-war demolition of fabric at Bletchley Park, namely Elmers' School, Block F, Huts 2, 5, 7, 9 and 9a, 10a, 11b, 12, 14, 15a-d, 19, 23. The most significant of these comprise Huts 7 and 15, Block F and Elmers' School. Hut 7 was the Hollerith card-punching section, whose function moved to Block C in late 1942. The Hut 15 group accommodated traffic analysis sections brought into BP from the Y stations. Block F was the biggest of the wartime blocks, housing Japanese codebreaking sections and especially famous as the first permanent home of the Newmanry and Testery. The first Colossus was housed here in January 1944.

[3] A large house at Blockley in Gloucestershire has retained its wartime hospital hutting, and Bawdsey Manor in Suffolk (where Robert Watson Watt and his team developed radar technology in the late 1930s) has retained wartime and earlier structures in combination with a fine Domestic Revival house. These are the only other comparable examples. (Information from Roger Thomas, English Heritage).

[4] The purpose of this table is to summarise the key significances of the fabric at BP. Further details are in the table in Part 5 of the Management Plan draft. Sources are threefold: the Evans report of April 2003, the GCHQ *Huts and Blocks* report of November 2003, and the detailed investigation of the site and fabric by English Heritage.

Despite this past demolition, the most significant huts and blocks relating to the development of signals intelligence and the development of analytical machinery have survived.

The right-hand column, entitled significance, briefly describes the relationship of the values defined above to the external form, scale and detail of each building, and where relevant to its interior plan and detailing. It is thus intended as a platform for discussion amongst key stakeholders during the early stage of the Masterplan process.

5.1 Pre-existing fabric

This relates to all the key values outlined above, particularly through their architectural character to the site's significance as a country house and its associated park adapted for wartime use.

NAME & DATE	FUNCTION	SIGNIFICANCE *This section is intended to outline the extent to which key values are reflected in scale, external form and internal detail and planning of individual structures.*
THE MANSION 1870s, altered and extended 1883-6 and c1906 for HS Leon. *Currently listed grade II*	Served as major HQ and recreational building in WWII.	Fine interior and exterior. Evidence throughout building of wartime partitioning and alteration. The dominant and iconic feature of BP, its opulent style standing in contrast to the austere appearance of the wartime huts and blocks. This contrast is a key feature of the site's present-day character, providing a touchstone to its transition from the hub of a large Victorian estate – whose remains in Bletchley itself include gate lodges and cricket pavilion – to the nucleus of the country house culture that sustained life here during WWII.
COTTAGES 1, 2 AND 3 A row of 3 cottages, probably originally an alteration and extension of an earlier N range undertaken c.1890. THE BUNGALOW is part of same complex. *Currently listed grade II*	Served as a vital cryptographic research centre from September 1939, where first breaks into German Enigma were made and which sustained roll-out of sheet-based production system in Huts 1 and 6 and then the bombes in Hut 1. ISK, the section founded by Dilly Knox which dealt with machine-based German codes, based here until its move to Elmers' School in Feb. 1942.	External form, scale and detail. Externally complete, and facing into a stable yard bounded by buildings which all convey a strong sense of a core part of the Victorian park adapted for wartime use. Character and scale clearly relate to the early 'cottage industry' phase of GCCS's development at BP. Associations with Turing, Gordon Welchman and Dilly Knox, the classically-trained cryptographer who was a key figure in the 1940-1 breaks into Enigma, including the Abwehr secret service codes.

5.2 *Huts and Blocks relating to BP's development into a global SIGINT hub*

Signals intelligence at BP falls into 3 major categories:

1 The hut system for decryption (in Huts 6 and 8) and the evaluation and analysis (in Huts 3 and 4) of intercepted traffic, concentrating on the Enigma and later Lorenz codes developed for the German army, navy, air force and High Command. As developed under Gordon Welchman and the Assistant Director Edward Travis late in 1939, this system formed the basis of BP's development into a global SIGINT hub, underpinned its contribution to the war effort and drove the development of analytical machinery. *The Huts became quickly associated with working units rather than fixed structures.* Hut 4 moved into Block A in August 1942, Huts 3-6-8 moved into Block D in February 1943.

2 Traffic Analysis, a means of gaining intelligence from the analysis of enemy transmissions without decryption. This grew in importance, moving with Hut 4 into Blocks A/B and with Huts 3 and 6 into Block D in February 1943: the latter being a self-contained unit, named SIXTA, moving to Block G in October 1943.

3 The breaking of the Abwehr (German Secret Service) codes. The machine codes were first broken by Dilly Knox and his team in The Cottage, which in due course revealed key information regarding the Holocaust and underpinned the turning of agents and the Double Cross deception that played a key part in the D-Day landings. ISK (Intelligence Service Knox) was joined by Oliver Strachey's section (ISOS, based at Elmers' School) dealing with Abwehr hand ciphers. ISK moved to Elmers' School (demolished) in Feb. 1942, and then to Hut 6 (ISOS moving to Hut 8) in February 1943, and then with ISOS to Block G in October 1943.

NAME AND DATE FIRST OCCUPIED	FUNCTION	SIGNIFICANCE *This section is intended to outline the extent to which key values are reflected in scale, external form and internal detail and planning of individual structures.*
Hut 3 January 1940, moving to present building from smaller (demolished) hut occupied in October 1939.	Used for the intelligence analysis of the decrypted army/air force material from Hut 6. The hub of Hut 3's ability to evaluate and report on decrypted intelligence was the Index and Watch – see Block D.	External form, scale and detail. The Index and Watch Rooms are amongst the most complete parts of the interior. As the decision-making hub, they are of great significance in relating to the early and intermediate stages of the development of SIGINT, before the move to D Block (where Index and Watch Rooms have also survived) in February 1943. External form, scale and detail.
Hut 4 October 1939	Built for the intelligence analysis of the decrypted material from the German Navy (Hut 8). Also for some low-level decryption and traffic analysis.	Interior largely gutted, transformed post-war. External form, scale and detail.
Hut 6 January 1940	Built for the decryption of raw material from the German Army and Air Force, with the assistance of perforated sheets and then bombes. Under its head Gordon Welchman, Hut 6's Machine Room – along with Hut 8, initially headed by Alan Turing - became a major driving force in the development of analytical machines at BP to speed up the decryption process. In September 1943 Welchman became responsible for oversight of all the machines being	External form, scale and detail, retaining clear evidence on W side for former above-ground tunnel that sent decrypts to Hut 3. Internal plan and detail. Surviving internal partitioning installed for ISK – section dealing with Abwehr (secret police) communications - after move of Hut 6 staff to Block D in March 1943. ISK later moved to Block G.

	developed at BP.	
Hut 8 January 1940	Built for the decryption of raw material from the Navy, with the assistance of perforated sheets and then bombes. First break into Naval Enigma (Dolphin) early in 1941 has significant impact on Battle of the Atlantic. Under its heads Alan Turing and then Hugh Alexander Hut 8 became a major driving force in the development of analytical machines at BP to speed up the decryption process. Acquired additional significance during and around D Day, an aerial array located outside Hut 8 (then renamed Hut 18) communicating direct with the Y intercept stations and operational commands.	External form, scale and detail. Interior: 'Big Room' survives at N end, and part of Turing's office. Otherwise gutted.
Blocks A and B Fully occupied August and September 1942.	Took on functions of Huts 4 and Naval Section, catering for expansion after considerable increase in volume of naval and U-boat activity. Accommodated cryptography sections, including Japanese, as Hut 4 also responsible – alongside Meteorological and Air Section units based here – for feeding back results of traffic analysis and low-level decrypts to Hut 8 (in D Block from Feb 1943).	Imposing two-storey block (in contrast to other post-1942 blocks at BP). External form, scale and detail, particularly the elevation facing onto the lake. Some windows enlarged in 1950s. The office of Frank Birch (Head of Naval Section) at W end is marked by a bay window. Major brick partition walls remain, otherwise internally remodelled from 1950s. War-time staircases, entrances, corridor walls and door partitions survive, enabling reconstruction of original layout with individually planned outer spurs set around corridor range with centralised services such as library. Completely gutted May 2004.
Block D February 1943	Took on functions of Huts 3 (to west) and 6 (centre) and 8 (east), in addition to the burgeoning traffic analysis sections (merged into SIXTA late in 1943). It reflects in its layout, which was the result of consultation with Ministry of Works architects, the need for secrecy and compartmentalisation between the huts. Block D became the main reporting centre from February 1943 for all Enigma on German Army and Air Force communications and also for "Fish" encyphered printer traffic from the Testery and Newmanry in Block F and later from Block H. Hardened against air attack with internal expansion joints and steel frames protecting the teleprinter rooms.	Its scale (housing 1000 people) and compartmentalised planning, each of the spurs being individually designed and adapted to fulfil their respective roles, directly relates to BP's development into a global SIGINT hub. Strong degree of preservation in external form, scale and detail, particularly the southern elevation, and interior evidence for original paint finish, light fitments, doorways, communication hatches, floor covering, electrical conduits, communications systems and other detail.

	Particularly close working relations not only with Blocks A/B and the communications block but also with the bombe sections (in Huts 11/11a), the Hollerith section in Block C and the valve-based Robinson and Colossus machines, and other adapted machinery, in Blocks F (demolished) and H. Huts 3-6-8 made a major contribution to the success of Operation Overlord. The largest and most fully-integrated section was Hut 3, which had various liaison (including naval and US) and analysis/research sections, and took on the distribution of ISOS and ISK transmissions. The hub of operations in Hut 3 was the Watch Room, where the Watchkeepers (responsible for emendation and translation) and naval, army and air advisors (responsible for evaluation, commenting and signal drafting) and worked in close liaison, supported by the key functions of the card indexes. After summer 1942 the Duty Officer was responsible for making the final decision on communications to Commands and service HQs, which were made through the Signals Office.	Some clear survival of original wartime rooms, the best evidence for SIGINT at BP alongside small parts of Huts 3 and 8. Especially significant are: • The axial corridor; • Spurs M (admin. For Hut 6), B (Hut 3 files, offices and admin.) and C (used by 6 I.S. before move to G Block) with its watch room and offices; • Spur H teleprinting room (to south) and Signals Office, and Spur K teleprinting room; • Spur I, with communications from Block E passing along central corridor to Reception Point at head, flanked by Index Rooms and Watch Rooms to S of axial corridor.
Block G October 1943	Plans late in 1943 for the expansion of D Block into G Block (intended for the traffic analysis and German secret service organisations), clearly displayed a tension – in its mix of bespoke and standardised planning - between the need to plan according to function and the need to shoehorn in a rapidly expanding organisation. Built to extend the functions of Block D. Housed in (gutted) single-storey spurs to west ISK (Enigma Abwehr decrypts) and ISOS (hand cyphers, and evaluation of material from ISK before sending via Hut 3 to Ministries and Intelligence Staffs). Housed in 2-storey U-shaped block to east the amalgamated Traffic Analysis sections, renamed Sixta in February 1944. All these sections made a major contribution to the success of Operation Overlord.	Occupies higher ground to N of Block D, prominently set against the late 19th century wooded landscape. Thus makes a particular contribution, through its form and mass, to the character of the site. Two-storey block, built in contrast to most fabric at BP to standard layout, occupied by Sixta internally little altered with evidence for Watch Rooms and offices (as in Spur C of D Block). Single-storey and more individually planned spurs occupied by ISK and ISOS gutted. ISK and ISOS played a key role in the preparations for D Day (through the Double Cross operation of misinformation and turning spies). Traffic analysis played a vital role as the volume and complexity of traffic received by BP increases later in the war.
Hut 10 February 1941	Held Typex machines followed in early 1942 by Air Section and then Codes Section, the latter linked to the Secret Intelligence Service and the overseas operations of SoE agents.	Completely rebuilt in 2002 by the MOD, who took great care to replicate the wartime finish. The whole structure is actually a pastiche with few if any pieces of wartime fabric remaining.

5.3 Huts and Blocks relating to the birth and formative development of the Information Age

With the exception of the loss of Hut 7 (Hollerith section) and Block F (the S half of which was adapted for the Newmanry and Testery) the site clearly displays the developing scale of information technology. This displays a progressive development from its 'cottage industry' phase and initial small scale of production (The Cottage, see above, and Hut 1), to the first stages in mass production of bombe machines (Huts 11 and 11a) and the large scale structures relating to the scale of in-house punch-card technology (Block C) and accommodation of the final generation of valve-driven computers (Block H) built for the processing of German Fish traffic.

NAME AND DATE FIRST OCCUPIED	FUNCTION	SIGNIFICANCE *This section is intended to outline the extent to which key values are reflected in scale, external form and internal detail and planning of individual structures.*
Hut 1 Late 1939	Radio transmission station and manufacture of perforated sheets. Accommodation of bombes from March 1940.	Small scale is highly significant, as it graphically conveys the first experimental phase of information technology and its application to SIGINT on the site. External form, scale and detail. Internally largely unaltered.
Hut 11(originally known as 11a) March 1941	Accommodation for bombes, replacing a smaller wooden hut built in late 1940. Solidly built in order to provide some protection against air attack and better storage conditions for the bombes, its larger scale formed the template for the planning of the bombe outstations. Became main control centre for all bombes in UK, and first Newmanry established here in June 1943 when Experimental Robinson and first Tunny Machine are installed. When the larger Bombe outstations were opened between mid 42 and early 43, this became the bombe operations section control room but still accommodated six or seven high speed Bombes, Funf and another Abwher bombe and various prototype machinery for Robinsons etc. 11B (a timber or plasterboard hut) was built in early 1942 as a training school.	Significant in terms of its external completeness and scale in relationship to the first stage in the *mass production* of bombe machines, marking BP's development into a global SIGINT hub capable of processing increasingly vast amounts of traffic. External form, scale and detail. Internally largely unaltered.
Hut 11A February 1942	Extension for bombes and bombe training centre. Same use throughout WWII.	As above.
Block C November 1942	Held Hollerith card-punching section, taking on function of Hut 7. Bespoke plan and large scale linked to substantial in-house provision of punch-card, tabulating and sorting machines, manufactured on licence from IBM by British Tabulating Machine Company, housed in soundproofed open plan. Working practices in Hollerith section taken by US SIGINT authorities as model for	Certainly one of the largest purpose-built buildings for tabulating machines in the world, particularly significant in relationship to information technology being the secret adaptation by BTM and GCCS staff of machinery in the machine and repair rooms (Spur 6, originally closed off).

	development of their larger Hollerith establishments in Washington DC. The Naval Enigma sections in Hut 8 were especially dependant on the Hollerith machines. In the post-war period this building was retained as a training centre for GCHQ staff.	External form and scale most clearly relates to bespoke planning and scale of operations at BP. Interior largely subdivided.
Block H September 1944	This was built as a purpose-built extension for Colossus and Robinson computers. The unique plan, with two machine room spurs either side of a central boiler house.from which extends a narrow north wing, was created from modules of a type plan published by Ministry of Works and Buildings in 1942. It has	Refenestrated, a similar machine room surviving at Eastcote, one of the bombe outstations. Its large scale – in contrast to the accommodation for the bombes – is a direct link to the larger scale of computing technology as finally developed at BP. The two southern machine rooms are the best-preserved part of the interior.

3a Other buildings relating to Bletchley's role as a global information hub

Teleprinter Rooms (adjoining W end of Block A) October 1942 Block E March 1943	Both buildings, the first originally built in relationship to now-demolished teleprinter huts and building of 1941, went through several rebuilding phases, a reflection of the massive increase in intercepted traffic (as conflict widened) and thus internal communications (using pneumatic tube systems) and outgoing messages (using teleprinters). Block E took on traffic from Y stations etc and then communicated results of BP analysis, encoding them on Typex machines, including the US SIGINT authorities, mobile operational units and commands.	Some post-war alteration, including demolition, inserted windows and extensions. Interiors substantially remodelled, although first-floor spaces of Block E recoverable. Significance mostly resides in central location (testament to communications hub role) and external scale and form. E Block, built to a cross-shaped plan still legible, significantly retains in its N wing the covered walkways under which communications were taken direct to Spur I in D Block.
Garages to SW of Stable Yard	For housing vehicles taking communications in and out of BP. It was built for 'utilities', which it is assumed refers to the standard army issue Humber or Austin shooting brake. This building appears to be unique to BP and is of concrete and brick. The 'utilities' maintained a courier run to various outstations and the London ministries throughout the war. An important although undervalued part of BP's role.	External scale and form.

Like every other wartime factory the staff arrived for shift work by public transport and bikes and then left at the end of their shift. The bicycle racks in front of Block D and the sheds for the coaches (to the east of the present site entrance) are a link with this ordinary aspect of BP as well as another indication of the large size of the workforce. They also illustrate the Parks' strong local connection with the majority of its workforce billeted in what is now Milton Keynes. The Chauffeur's hut is on the west side of the garage compound and is now the BP gift shop. Other elements of the usual MT section such as the petrol dump and lubricant stores have been demolished. Wilton Avenue retains part of the women's hostel on the east side, and on the west side the Canteen and Assembly Hall (Wilton Hall) of 1942-3.

Despite reports to the contrary, there is no evidence for wartime tunnels or underground rooms at Bletchley Park. Air raid provision was extremely poor, the basement in the Mansion and the strengthened Hut 11 and Blocks C and D providing some protection against blast. There are visible remains of a trench shelter complex in the lawn to the south of Hut 4, and an ARP post with look-out remains on the roof of E Block.

Annexe Principal Foreign SIGINT Centres

Headquarters	Period	Location	Organisation	Scale	Primary Role	Associated Technology	Direct impact on WWII	Significant Events & associated people
Arlington Hall (AH) USA (moved here in mid 1942, from Munitions Buildings near White House)	Mid 1942 – 1945	Washington, USA	Signal Security Agency (SSA) Army affiliated	approx. 8000 people	Codebreaking (Purple) + Intelligence production (Magic) + Ultra in association with BP	Autoscritcher & Superscritcher (1943) various RAM in association with private companies	Substantial– especially the 'Magic' intelligence gleaned.	Sep 1940 - 1st Purple breakthroughs (by SSA before moving to AH) Summer 1942 analysis on Japanese Army messages May 1944 – RAM used on Japanese army problems
Naval Communications Annex (NCA) USA, moved to Mount Vernon Seminary, 380 Nebraska Avenue	November 1942 – 1945	Washington, USA	Naval Intelligence (OP-20-G)	approx. 6000 people	Codebreaking (Jap. naval) & Enigma in association with BP	Accommodated 120 high-speed Bombes, made by National Cash Register Company, Dayton, Ohio (1943)	Substantial	Sep. 1940 Japanese naval codes broken (by OP-20-G before moving to NCA) 22 Jun. 1943 – 1st results from Navy Bombes sent to BP
Pyry Headquarters POLAND	1934 – September 1939	Kabackie Woods, Pyry POLAND	Polish Cipher Bureau	unknown (around 50 people)	Codebreaking (Enigma)	Bomba (1938)	All intelligence was pre-WWII, having major impact on GC & CS	Dec. 1933 – 1st Enigma breakthroughs 1938 – Bomba & Zygalski sheets created 24 July 1939 Pyry meet
Chateau Vignolles (BRUNO) FRANCE	Oct. 1939 – June 1940	Gretz – Armainvillers (near Paris) FRANCE	French + Polish Cipher Bureaux	approx. 72 people	Codebreaking (Enigma) – in association with BP	N/A	Important liaison role with GC & CS	17 Jan. 1940 – Poles break 1st wartime enigma setting using Polish method

Villa Cadix (CADIX) FRANCE	Oct. 1940 – May 1942	Uzes FRANCE	French + Polish Cipher Bureaux	approx. 30 people	Codebreaking (Enigma) – in association with BP	N/A	Important liaison role with GC & CS	N/A