Built to Resist

An Assessment of the Special Operations Executive's Infrastructure in the United Kingdom during the Second World War, 1940-1946

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VOLUME I

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Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to any other University for the award of any other degree.

Derwin Gregory

Abstract

During the Second World War, the British Government established the Special Operations Executive (SOE) for the purpose of coordinating 'all action, by way of subversion and sabotage, against the enemy overseas'. Although the overseas operations of this branch of the British Secret Services are relatively well known, no previous study has assessed the organisation's UK based infrastructure. This thesis represents the first time the entire UK property portfolio of a clandestine government agency has been assessed. By addressing this gap in our knowledge, this thesis has increased the number of identified properties operated by SOE by 30%. This was achieved by undertaking a desk based assessment which combined pre-existing historical and archaeological methodologies.

At the start of the Second World War, there were few existing facilities established within the UK to support clandestine operations. As the conflict progressed, in parallel to learning the operational procedures of their trade, SOE also had to rapidly expand their support infrastructure. The organisation could only effectively function by establishing facilities dedicated to training, research and development, supply, transportation, communication and command and control. These facilities, when required, combined reflectivity and innovation. It was, however, SOE's preference to utilise pre-existing structures, where feasible, instead of erecting new buildings. Those facilities which were constructed were generally unique to the organisation. By assessing SOE's UK property portfolio, this thesis goes some way to countering the often held notion that the organisation was 'amateurish'.

Contents Page

VOLUME I

Declaration	i
Abstract	ii
Contents Page	iii
List of Figures	vi
List of Tables	x
Abbreviations	xi
Acknowledgments	xiv
CHAPTER I: Introduction	1
SOE's Function	4
SOE: An Historiography	5
The Methodological Approach to Researching SOE's Built Infrastructure	8
Built to Resist: Thesis Structure	14
CHAPTER II: Historical and Archaeological Context	16
Archaeological Context	16
SOE's Historical Context	21
SOE's Central Characters	25
SOE's Internal Organisation	29
SOE's Operations	29
SOE's Origins: The Facilities of SIS's Section D, MI(R) and Department EH	31
CHAPTER III: Training	41
SOE's Training Regime: An Historical Context	45
The Nature of SOE's Training Facilities	68
The Legacy of SOE's Training Facilities	86
CHAPTER IV: Research and Development	88
The History of SOE's Research and Development Facilities	89
The Nature of SOE's Research and Development Facilities	93

SOE's Research and Development Infrastructure: A Case Study 114
SOE's Material Culture 117
Archaeological Remains 118
CHAPTER V: Supply 120
SOE's Supply Chain 121
The Nature of SOE's Supply Chain 130
SOE's Supply Chain: Equipping the Resistance 155
CHAPTER VI: Transportation 157
The Nature of SOE's Transportation Hubs 158
SOE's Transportation Infrastructure: a European Lifeline 186
CHAPTER VII: Communications 189
SOE's Network of Home Stations 192
The Nature of SOE's Communication Facilities 194
The Role of SOE's Wireless Facilities in Operation NORDPOL 209
SOE's Wireless Facilities: a Lifeline to the UK 213
CHAPTER VIII: Command and Control 216
SOE's Command and Control Distribution 217
Station XVB, the Natural History Museum 221
CHAPTER IX: SOE's Agents 228
Albert Robichaud 228
Max Manus, DSO, MC and Bar 234
CHAPTER X: Re-Thinking SOE 238
1942, a Changing Political Environment and the Growth of SOE 238
SOE: an Amateurish Organisation? 242
Inter-Organisational Relations 244
'Stately 'Omes of England' 247
The Destructive Nature of the Military 249
The Built Infrastructure of the Secret Services: a Theoretical Discussion 250
SOE's International Legacy 252
Survival of Sites 255
Cultural Significance 257
Concluding Remarks 262

CHAPTER XI: Bibliography 264
Primary Sources 264
Books 285
Articles 296
Thesis 305
Unpublished 306

VOLUME II

APPENDIX A: Gazetteer A1
APPENDIX B: Station 53b Architectural Survey Report Bi
APPENDIX C: Site Plans C1
C1: Site plan of Gaynes Hall, Cambridgeshire.
C2: Site plan of The Thatched Barn, Borehamwood.
C3: Site plan of Aston House, Hertfordshire.
APPENDIX D: Miscellaneous Data D1

List of Figures

Figure 1: Magazine at the Office of Strategic Service's (OSS) 'Area H'. 20
Figure 2: The history of SOE's formation in July 1940. 24
Figure 3: SOE's internal organisation in the summer of 1943. 28
Figure 4: St Ermin's Hotel, the first headquarters of SIS's Section D. 32
Figure 5: Bletchley Park, home to Section D until they relocated to Aston House. 33
Figure 6: Lochailort, home to MI(R)'s Special Training Centre. 34
Figure 7: Arisaig House, home to a MI(R) training facility. 35
Figure 8: Electra House, home of Department EH. 36
Figure 9: The Riding School, Woburn Abbey. 37
Figure 10: Paris House, Woburn Abbey. 38
Figure 11: A map of SOE's property portfolio during the Second World War. 39
Figure 12: Graph of the number of SOE's STSs. 43
Figure 13: A composite map of the distribution of SOE's STSs. 44
Figure 14: Inverlair Lodge, the 'Cooler'. 48
Figure 15: Distribution of SOE's Paramilitary Schools in the Scottish Highlands. 51
Figure 16: The landscape of Scottish Highlands is bleak and unforgiving. 52
Figure 17: Distribution of SOE's Finishing Schools in the Beaulieu area. 54
Figure 18: Beaulieu Manor, accommodation for the Finishing Schools instructors. 55
Figure 19: Industrial sabotage was one topics taught to students at SOE's STSs. 62
Figure 20: Students receiving training at STS17, Brickendonbury. 63
Figure 21: RAF Ringway, 1946. 65
Figure 22: Audley End House, home to STS43. 68
Figure 23: Aerial photograph of Gorhambury, Hertfordshire, taken in 1946. 70
Figure 24: Polish students undergoing rope work exercises at Audley End. 71
Figure 25: French Commandos attempting the assault course at Achnacarry House. 72
Figure 26: Trinidad units of the South Caribbean Force undergoing bayonet practice. 73
Figure 27: SOE's close combat training. 74
Figure 28: Example of a firing range layout as devised by Fairbairn. 76
Figure 29: Linge Company training in a Fighting House Complex. 78
Figure 30: Hypothetical plan of a 'fighting house'. 79

Figure 31: Instruction on how to sabotage a locomotive using a model. 81
Figure 32: Valentine Tank at Audley End being used for demolition practice. 82
Figure 33: Norwegian armoury at a STS in Scotland. 82
Figure 34: Aerial photograph of Frogmore Farm taken in 1945. 83
Figure 35: Entrance to one of the underground structures at Frogmore Hall. 84
Figure 36: An explosive rat designed by SOE. 88
Figure 37: Composite map of SOE's Research and Development facilities. 90
Figure 38: Pencil Time Fuze. 91
Figure 39: The Frythe home to SOE's main research and development centre. 92
Figure 40: SOE's Welrod. Designed at The Frythe. 92
Figure 41: The Frythe in 1946. 96
Figure 42: Hut in the grounds of The Frythe. 97
Figure 43: Interior of the Chemical Laboratory. 98
Figure 44: A Welman being lifted out of a hangar in the grounds of The Frythe. 99
Figure 45: Exterior of the Thermostat Hut at The Frythe. 100
Figure 46: Interior of the Thermostat Hut. 101
Figure 47: The thermostats within SOE's Thermostat Hut. 102
Figure 48: A 'Sleeping Beauty' being tested in the tank in the grounds of The Frythe. 103
Figure 49: One of the magazines constructed within the grounds of The Frythe. 104
Figure 50: Wykeham House, home to the Polish Military Wireless Research Unit. 107
Figure 51: Cradles at Queen Mary's Reservoir. 109
Figure 52: The Great Western Hotel, Fishguard, home to SOE's Station IXc. 111
Figure 53: A Welfreighter being lifted into Fishguard Bay by cranes on the harbour. 112
Figure 54: A 'Welfrighter' being tested in Fishguard Harbour. 112
Figure 55: The security measures established round the TIRPITZ whilst berthed. 115
Figure 56: Google Earth image of The Frythe. 119
Figure 57: Distribution of SOE's supply facilities within the UK. 121
Figure 58: The Thatched Barn, located on the Barnett bypass. 123
Figure 59: Bride Hall, Station VI, home to SOE's Small Arms Section. 125
Figure 60: Richmond Terrace, London. 126
Figure 61: The stable block of Audley End House. 127
Figure 62: Gaynes Hall, Huntingdonshire. 128
Figure 63: Aston House, Hertfordshire, home to SOE's main supply facility. 131
Figure 64: Bontex Knitting Mills, Wembley, Station VIIa. 132

Figure 65: Graph showing the value of MoS contracts placed with Station VIIb. 133
Figure 66: Briggins, Essex, Station XIV. 134
Figure 67: Aerial photographic transcription of The Thatched Barn. 135
Figure 68: The metal workshop and props shop in the grounds of the Thatched Barn. 136
Figure 69: Aston House from the west. 140
Figure 70: Site plan of Aston House based on aerial photography transcription. 141
Figure 71: Storage facilities at Aston House. 142
Figure 72: The four types of magazines constructed at Aston House. 143
Figure 73: Bride Hall, Station VI, home to SOE's Small Arms Section. 144
Figure 74: Army supplies issued by SOE between March and October 1944. 145
Figure 75: The Type 'C' container at OSS's Area H, Holmewood. 148
Figure 76: Gaynes Hall, Station 61, home to SOE's Packing Section from 1942. 149
Figure 77: Area H, Holme, home to the OSS's packing facility. 151
Figure 78: One of the magazines at Area H. 152
Figure 79: Google Earth image of Gaynes Hall, now HMP Littlehey. 154
Figure 80: SOE's transportation hubs were spread across the UK. 158
Figure 81: Destinations of operations conducted by the Helford Flotilla. 161
Figure 82: Ridifarne, home to the shore establishment of the Helford Flotilla. 162
Figure 83: The number of operations undertaken by the Helford Flotilla. 163
Figure 84: The Shetland Islands, home to the Shetland Bus. 165
Figure 85: Lunna Voe, the first home of the Shetland Bus. 166
Figure 86: Prince Olav's slipway. 168
Figure 87: The locations of drop zones between 26 February and 22 June 1943. 171
Figure 88: The number of sorties undertaken for SOE by air and sea. 173
Figure 89: The location of RAF Tempsford. 174
Figure 90: RAF Tempsford in September 1942. 176
Figure 91: Next to RAF Tempsford was the Great Northern Railway line. 178
Figure 92: Gibraltar Farm, Tempsford, home to SOE's operational centre. 179
Figure 93: Interior of Gibraltar Barn. 180
Figure 94: The monthly number of sorties conducted by 138 and 161 Squadrons. 181
Figure 95: The pre-existing structure to the east of RAF Tempsford. 182
Figure 96: RAF Tempsford's bomb dump. 183
Figure 97: SOE's Home Stations in Buckinghamshire. 191
Figure 98: Grendon Underwood, home to SOE's first receiver. 194

Figure 99: SOE's first transmitter at Charndon. 195
Figure 100: SOE's facilities at Grendon Underwood. 196
Figure 101: The receiver of SOE's first purpose built Home Station, Station 53b. 197
Figure 102: The aerial farm at SOE's Station 53b. 198
Figure 103: The transmitter building of SOE's Station 53b at Godington. 198
Figure 104: Architectural survey of Station 53b transmitter, Godington. 199
Figure 105: The interior of Station 53b transmitter at Godington. 200
Figure 106: The aerial farm at Godington. 201
Figure 107: Station 53a's new transmitter at Charndon. 202
Figure 108: Station 53b's generator building at Godington. 204
Figure 109: Whaddon Hall home to SIS's Main Line Station. 205
Figure 110: Inside of SIS's wireless facility at Upper Weald. 206
Figure 111: The interior of one of SOE's receiving facilities. 207
Figure 112: Frequencies allocated for Operation OVERLORD. 209
Figure 113: SOE's Command and Control infrastructure within London. 217
Figure 114: 64 Baker Street, home to SOE's headquarters. 218
Figure 115: SOE clustered their 'safe houses' in areas of London. 220
Figure 116: The floor plan of Station XVB. 221
Figure 117: Exhibits within SOE's Demonstration Room were kept behind glass. 222
Figure 118: View across the lecture hall established in SOE's Demonstration Room. 223
Figure 119: Items on display at Station XVB would have been familiar to agents. 224
Figure 120: As a security precaution, Secret Services restrict access to knowledge. 225
Figure 121: Dioramas within the Demonstration Room were superfluous. 226
Figure 122: Display of SOE's achievements at Station XVB. 227
Figure 123: A map of Albert Robichaud's operational life with SOE. 229
Figure 124: The effect of fighting on Combat Efficiency. 241
Figure 125: Camp X, Canada. 253
Figure 126: The bullet scars on the Church of St Cyril and Methodius, Prague. 254

List of Tables

Table 1: The number of filing cabinets destroyed between 1946 and 1947. 10
Table 2: SOE's sites covered by Google Earth. 11
Table 3: SOE's properties with features visible on historic aerial imagery. 12
Table 4: The 'ages of war' 19
Table 5: SOE's training programme comprised of a series of stages. 69
Table 6: Archaeological remains which might identified at SOE's STSs. 85
Table 7: Equipment designed by SOE during the Second World War. 94
Table 8: Planned budget of the PMWR Unit for the year 1944 to 1945. 107
Table 9: Radios manufactured by the PMWR Unit: 1 May 1943 to 8 June 1945. 108
Table 10: The quantity of equipment adapted at Station XV prior to December 1944. 137
Table 11: Contents of the Auxiliary Unit Mark II. 139
Table 12: A selection of the Army supplies issued by SOE from 1940 to 1945. 146
Table 13: Main trade stores issued by SOE. 146
Table 14: Some of the varied Trade items SOE supplied to the resistance. 147
Table 15: The number of containers packed at Gaynes Hall. 150
Table 16: The changing staffing levels at SOE's packing facility at Gaynes Hall. 150
Table 17: Operations by 138 and 161 Squadrons between March and July 1942. 184
Table 18: Reference to SOE within Pastscape and HER datasets. 256

Abbreviations

BBC	British Broadcasting Corporation
BEF	British Expeditionary Force
BSC	British Security Coordination
C	Head of SIS
CBA	Council for British Archaeology
CD	Head of SOE
CIA	Central Intelligence Agency
CoS	Chiefs of Staff
CRD	Camberley Reception Depot
DBA	Desk Based Assessment
Department EH	Department Electra House
DF	Direction Finding
DMI	Director of Military Intelligence
DMO	Director of Military Operations
DMWD	Department of Miscellaneous Weapon Development (RN)
DNI	Director of Naval Intelligence
DoB	Defence of Britain
DoD	Department of Defence
DSR	Director of Scientific Research
DZ	Drop Zone
FANY	First Aid Nursing Yeomanry
FO	Foreign Office
FSP	Field Security Police
GCCS	Government Code and Cypher School
GPO	General Post Office
GS(R)	General Staff (Research)
HE	High Explosives
HER	Historic Environment Record
HMP	Her Majesty's Prison
HQ	Headquarters

IED	Improvised Explosive Device
ISRB	Inter Services Research Bureau (cover name of SOE)
JIC	Joint Intelligence Committee
NCO	Non Commissioned Officer
MCU	Mobile Construction Unit
MEW	Ministry of Economic Warfare
MGB	Motor Gun Boat
MI(R)	Military Intelligence (Research)
MI5	Military Intelligence Department 5
MI6	See SIS
MI8	Military Intelligence Department 8
MO1(SP)	Cover name of SOE
MoD	Ministry of Defence
MoI	Ministry of Information
MT	Motor Transport
MTB	Motor Torpedo Boat
MWB	Ministry of Works and Buildings
NAAFI	Navy, Army, Air Force Institute
NID	Naval Intelligence Division
NID(C)	Naval Intelligence Division (Clandestine)
NMR	National Monument Record
OC	Officer Commanding
OD	Ordnance Datum
OR	Other Ranks
OS	Ordnance Survey
OSS	Office of Strategic Services
PCO	Passport Control Office
PID	Foreign Office's Political Intelligence Department
PMWR	Polish Military Wireless Research
PTSD	Post Traumatic Stress Disorder
PWE	Political Warfare Executive
RAF	Royal Air Force
RAOC	Royal Army Ordnance Corps

RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
RCAHMS	Royal Commission on the Ancient and Historical Monuments of Scotland
RCD	Radio Communication Division
RCHME	Royal Commission for Historical Monuments of England
RE	Royal Engineer
RN	Royal Navy
ROF	Royal Ordnance Factory
RSS	Radio Security Service
RTU	Returned to Unit
SAB	Student Assessment Board
SAS	Special Air Service
SD	Special Duties
Section D	Department within SIS
SIS	Secret Intelligence Service
SO1	Section within SOE which dealt with propaganda
SO2	Section within SOE which dealt with active operations
SO3	Section within SOE which dealt with administration
SOE	Special Operations Executive
STS	Special Training School
TAF	Tactical Air Force
TRE	Telecommunications Research Establishment
UK	United Kingdom
US	United States
USA	United States of America
USAAF	United States of America Air Force
WAAF	Women's Auxiliary Air Force
WO	War Office
WRNS	Women's Royal Naval Service
WT	Wireless Telegraphy

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CHAPTER I
Introduction

> 'An organisation is being established to co-ordinate all action, by way of subversion and sabotage, against the enemy overseas. This organisation will be known as the Special Operations Executive'.[1]

Within the field of archaeology, the study of twentieth century military heritage is a relatively recent phenomenon.[2] In comparison, scholarly research into the British Secret Services has a long and distinguished history. This thesis, therefore, sits between two complementary historiographies to produce, for the first time, a holistic assessment of the entire infrastructure of one of Britain's Secret Services. By studying the Special Operations Executive's (SOE) UK based support infrastructure,[3] the extent of the organisation's capacity and capabilities can finally be understood. The historical, archaeological and cultural heritage context in which this thesis sits will be discussed in Chapter II.

Although some authors have previously tackled aspects of SOE's support infrastructure, no comprehensive assessment of the organisations capacity within the UK has been undertaken.[4] It was only in 2004 when the Council for British Archaeology (CBA) published *Modern Military Matters* that SOE was first identified as an important field of study.[5] This report identified that initial research

[1] TNA CAB 301/51 Report to the Minister of Economic Warfare on the Organisation of SOE p. 1
[2] This has been pioneered by English Heritage. See John Schofield, *Modern Military Matters: Studying and Managing the Twentieth-Century Defence Heritage in Britain: a Discussion Document* (York, 2004).
[3] Infrastructure is defined by NATO as 'the static buildings, facilities and other permanent installations required to support military capabilities' (NATO, *AAP-06 NATO Glossary of Terms and Definitions* (NATO 2013), p. 2-1-4)
[4] See Ian Valentine, *Station 43: Audley End House and SOE's Polish Section* (Stroud, 2004), Des Turner, *Aston House Station 12: SOE's Secret Centre* (Stroud, 2006), Bernard O'Connor, *RAF Tempsford: Churchill's Most Secret Airfield* (Stroud, 2010), Bernard O'Connor, *Churchill's School for Saboteurs: Station 17* (Stroud, 2013), Patrick Yarnold, *Wanborough Manor: School for Secret Agents* (Guildford, 2009), Edward Wake-Walker, *A House for Spies: SIS Operations into Occupied France from a Sussex Farmhouse* (London, 2011) and Nigel West, *Secret War.*
[5] John Schofield, *Modern Military Matters* pp. 40, 49-53, 55-6. SOE fits under the following priorities: A7 Intelligence and Infrastructure, D1 The roles of excavation and analytical survey, D2 Social archaeology and interpretation of layout, D3 Oral history, D4 'Personality' of military areas, E1 Terminology, F1 Local level, F2 Regional level, F3 National level and F4 International level.

into this organisation should focus on published literature and documents held in archives. By undertaking this thesis, the author has addressed this research priority.

Over SOE's operational life, it was to become one of the most controversial of Britain's Secret Services.[6] The organisation's post-war legacy has also been beset by allegations of incompetence particularly advocated by the Secret Intelligence Service (SIS). Today, accusations of 'amateurism' still appear in press. On 7 July 2014, Hugh Reilly, writing in the *Scotsman*, referred to SOE as 'that derring-do bunch of toff idiots, recruited Boy's Own types whose intellectual capacities were on a par with Frank Spencer'.[7]

The historiography of SOE has, however, not remained static (see pp. 5-8). Richard Deacon, a historian of the British Secret Services writing in 1969, stated that 'in achievements, in professionalism, and in organisation it never matched up to SIS; in many respects it was downright inefficient, wasteful, and even damaging to the war effort … [Others regarded the organisation as in a constant] departmental muddle, overwork[ed] at headquarters, inefficiency [*sic*] of wireless and security staffs, and amateurishness'.[8] By 2005, Neville Wylie, a professor of international political history, regarded 'the amateurishness for which SOE was routinely maligned had probably as much to do with any innate or institutionalized incompetence as with the legendary informality of the organization and the self-proclaimed "revolutionary" nature of the warfare it espoused'.[9]

In contrast, David Stafford, who is regarded as making as great a contribution to our understanding of the organisation as SOE's official historian, MRD Foot,[10] advocates a far less critical assessment. Although he accepts elements of the 'bumbling amateurishness of the British public school tradition, the muddling through, the inefficiency, the eccentricity [Stafford presents this] ... as the strategic disguise for what was in reality the clandestine arm of a determined attempt to

[6] Nigel West, *Secret War: The Story of SOE: Britain's Wartime Sabotage Organisation* (London, 1992) p. 1
[7] Hugh Reilly, 'I Spy an Espionage Opportunity', *www.scotsman.com/news/hugh-reilly-i-spy-an-espionage-opportunity-1-3469341* (accessed 7 July 2014)
[8] Richard Deacon, *A History of the British Secret Service* (London, 1969) p. 563
[9] Nigel Wylie, 'Introduction: Special Operations Executive – New Approaches and Perspectives', *Intelligence and National Security* 20.1 (2005) p. 11
[10] Mark Seaman, 'A Glass Half Full – Some Thoughts on the Evolution of the Study of the Special Operations Executive', *Intelligence and National Security* 20.1 (2005) p. 33. MRD Foot was the official historian of SOE in France and one of the most accomplished historians of the organisation.

further British interest in Europe'.[11] This interpretation regarded SOE as actually functioning efficiently within the paralysing limits imposed by the Foreign Office and the SIS. The organisation was assessed to have accomplished its role as effectively as any other branch of the British war effort.[12]

SOE's official historian, on questioning whether the organisation was any good, answered 'with an emphatic Yes'.[13] This view was also championed by Mark Seamon, an historian based at the Cabinet Office, who was of the opinion that although 'short-lived and frequently (and inappropriately) labelled "amateur" by its detractors, SOE nevertheless acquired a prominent position in most theatres of operations and exerted British influence on a truly global scale'.[14]

The study of any Secret Service is, however, not straightforward. Due to the clandestine nature of these organisations, these conclusions are based on partial and incomplete documentary records (see pp. 5-8). Previous studies into SOE have also generally focused on the 'glamourous', frontline activities of the organisation.[15] Although not as prestigious as acts of sabotage, SOE's UK based infrastructure was vital to the operation of the organisation.[16] For the first time, this thesis has addressed this significant gap in our knowledge of SOE. By utilising pre-existing desk based assessment methodology,[17] this study brings a new dimension to the field of SOE.

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[11] David Stafford, *Britain and European Resistance 1940-1945: A Survey of the Special Operations Executive with Documents* (London, 1980) p.5

[12] David Stafford, *Britain and European Resistance 1940-1945* pp. 5, 7

[13] Michael Foot, 'Was SOE Any Good?', *Journal of Contemporary History* 16.1 (1981) p. 179

[14] Mark Seaman, 'A Glass Half Full …' p. 28

[15] For published material on SOE's activities within specific countries see Charles Cruickshank, *SOE in Scandinavia* (Oxford, 1986), Michael Foot, *SOE in the Low Countries* (London, 2001), Michael Foot, *SOE in France* (London, 1966), Marcel Ruby, *F Section SOE: The Story of the Buckmaster Network* (London, 1990), Denis Rigden, *Kill the Fuhrer: Section X and Operation Foxley* (Stroud, 2002), Roderick Bailey, *The Wildest Province: SOE in the land of the Eagle* (London, 2008), Malcolm Tudor, *SOE in Italy 1940-1945: The Real Story* (Newtown, 2011) and David Stafford, *Mission Accomplished: SOE and Italy, 1943-1945* (London, 2012). For research on agents see Marcus Binney, *The Women who lived for Danger: The Women Agents of SOE in the Second World War* (London, 2002), Marcus Binney, *Secret War Heroes: Men of the Special Operations Executive* (London, 2006), Bruce Marshall, *The White Rabbit: The Secret Agent the Gestapo could not crack* (London, 2002), Sarah Helm, *A Life in Secrets: The Story of Vera Atkins and the Lost Agents of SOE* (London, 2006), Henri Raymond, 'Experiences of an SOE agent in France' in: *The Fourth Dimension of Warfare: Vol. 1 Intelligence/Subversion/Resistance*, ed. Michael Elliott-Bateman (New York, 1970).

[16] Without training, research and development, supplies, transportation, communication and command and control facilities, SOE could not have undertaken the wide range of operations they conducted on a global scale.

[17] This thesis is not utilising an innovative, new methodological approach. Desk based assessments are a tried and tested method of studying twentieth century military heritage. See pp. 8-14.

In order to contextualise the contribution of this thesis to the study of this organisation, this chapter will examine the role of SOE, its evolving historiography and the value of built heritage as an historical source. The methodology employed within this study will also be examined.

SOE's Function

Over the course of the Second World War, SOE was one of several of Britain's Secret Services. Although each organisation was allocated a different function, they often came into conflict due to overlapping interests. SOE's sister organisations included the Secret Intelligence Service (SIS), the Secret Service (MI5), the Government Code and Cypher School (GCCS) and the Political Warfare Executive (PWE). It was the function of SOE to 'co-ordinate all action, by way of subversion and sabotage, against the enemy overseas'.[18]

The organisation was formed by the British Government to operate along the lines of the Sinn Fein movement in Ireland and Chinese guerrillas fighting the Japanese. Inspiration was also taken from the Spanish Irregulars who fought alongside Wellington.[19] In order to achieve this, SOE was provided funding through the Secret Vote.[20] By April 1942, their expenditure was approximately £2,500,000 per annum.[21]

SOE, which only operationally existed for 71 months,[22] grew to a size where it employed a maximum of 10,000 men and 3,200 women.[23] Of these, one in four men and one in eight women were of officer status.[24] Under their control were tens of thousands of resistance fighters operating on a global scale.[25]

[18] TNA CAB 301/51 Report to the Minister of Economic Warfare on the Organisation of SOE p. 1
[19] Michael Foot, *SOE: The Special Operations Executive 1940-46* (London, 1993) p. 18
[20] TNA CAB 301/51 Report to the Minister of Economic Warfare on the Organisation of S.O.E. p. 33
[21] TNA FO 1093/155 Special Operations Executive Note by the Secretary of the War Cabinet 22/04/1942 p. 2
[22] Formed on 22 July 1940 and disbanded on 30 June 1946.
[23] For the purposes of comparison, SOE's manpower was the equivalent to a weak infantry division.
[24] Michael Foot, *SOE in France* p. 14
[25] Mark Seaman, 'A Glass Half Full …' p. 28

SOE: An Historiography

In order to provide context for this thesis, a brief historiography of the organisation is presented below.[26] Over the past decade in particular, the academic study of SOE has undergone a substantial transformation. The gradual release of classified documents into the public domain, combined with a more rigorous academic interpretation, has enabled scholars' opportunities to question initial preconceptions.[27]

The first attempt to record SOE's past occurred prior to the organisation's disbandment. As the war came to an end, a series of 'in-house' histories were commissioned.[28] The primary purpose of these documents was to ensure that SOE's hard learnt lessons were not forgotten. These reports also provided an historical record of the organisation's achievements.[29] Although the quality of these documents varies significantly by author, they offer scholars a useful narrative.[30] The task of combining these disparate accounts together into an 'official' history was allocated to William Mackenzie. As a political historian who had worked as a civil servant in the Air Ministry during the war, Mackenzie was ideally suited for this complex task. In order to facilitate his work, complete access to SOE's surviving archive was granted.[31] Mackenzie was also given the authority to request any document from other governmental departments which he could not locate within SOE's files.[32] On completion of his monograph, it was to remain classified until finally being published in 2000.[33]

The size of SOE combined with the public appetite for tales of clandestine operations, meant it was inevitable that agents' 'accounts' rapidly appeared in press after the war. Before Germany had surrendered, the War Office had cleared the first

[26] The historiography of SOE has been covered by more accomplished authors and in greater detail than is achievable in this short space. See Mark Seaman, 'A Glass Half Full …' pp. 27-73, Nigel Wylie, 'Introduction: Special Operations Executive …' pp. 1-13, Duncan Stuart, '"Of Historical Interest Only": The Origins and Vicissitudes of the SOE Archive', *Intelligence and National Security* 20.1 (2005) pp. 14-26, David Stafford, *Britain and European Resistance 1940-1945* and Michael Foot, *SOE in France*
[27] Nigel Wylie, 'Introduction: Special Operations Executive …' pp. 1, 5
[28] Ibid p. 2
[29] Mark Seaman, 'A Glass Half Full …' p. 29
[30] Nigel Wylie, 'Introduction: Special Operations Executive …' p. 2
[31] Mark Seaman, 'A Glass Half Full …' p. 30
[32] TNA HS 8/327 WJM/172 24/11/1947 p. 1
[33] William Mackenzie, *The Secret History of SOE: Special Operations Executive 1940-1945* (London, 2000)

of these for publication. George Millar's *Marquis*, written shortly after the author returned from operations in France, eventually ran to 70,000 copies.[34] Agents 'have [however] not always found it possible to keep to the unvarnished truth [in writing their memoires]. A sort of declension can be observed: from minor inaccuracies due to misinformation, or brought in to heighten the tone'.[35] Much of the early accounts of SOE were characterised by courageous stories. This appealed to the public's desire to read about adventures and helped book sales.[36] Post-war British culture was, therefore, inundated with tales of daring which has done much to shape public perception of SOE.[37]

This period coincided with an increased public scrutiny of SOE's activities in France. During the mid-1950s, reporters found that articles on the controversies which surrounded the organisation sold newspapers. Features and exposés, therefore, began making regular appearances in the popular press. In an attempt to address the accusations and counteraccusation of incompetence, Whitehall commissioned Foot to write the official history of SOE in France. Despite having access to the organisation's archive, his attempts to undertake interviews with key figures were severely restricted. The monograph, which was published in 1966, was the first publicly available scholarly study of SOE.[38]

During the period SOE was making newspaper headlines, there was a gradual deterioration of relations between East and West. This was a time when the *Comintern* was threatening to initiate a global workers revolution. British troops were also regularly deployed to undertake counterinsurgency operations against communist guerrillas.[39] Techniques and procedure which had been perfected by SOE

[34] Mark Seaman, 'A Glass Half Full …' p. 30
[35] Michael Foot, *SOE in France* p. 453
[36] Mark Seaman, 'A Glass Half Full …' p. 32
[37] Juliette Pattinson, '"A story that will thrill you and make you proud" The cultural memory of Britain's secret war in Occupied France', in: *British Cultural Memory and the Second World War*, ed. Lucy Noakes and Juliette Pattinson (London, 2014) p. 134. Shortly after the war, a number of films were recorded which did much to influence post-war perceptions. See *Carve Her Name With Pride* and *Odette.*
[38] Mark Seaman, 'A Glass Half Full …' pp. 31, 32, 33
[39] See Tim Carew, *The Korean War: the Story of the Fighting Commonwealth Regiments 1950-1953* (London, 1967), David Halberstam, *The Coldest Winter: America and the Korean War* (London, 2007), Rowland White, *Storm Front* (London, 2012) and Jonathan Walker, *Aden Insurgency: the Savage War in Yemen 1962-67* (London, 2011)

were now threatening British global interests.[40] These circumstances go some way to explain why the organisation gained such a bad post-war reputation.

By 1950, Basil Liddell Hart, one of the leading figures on military strategy, was condemning British support for the European Resistance during the war. It was his belief that it had a 'wider amoral effect on the younger generation as a whole to defy authority and break the rules of civic morality'.[41] It was inevitable that an organisation which had supported, equipped and trained radicals would become the focus of criticism when the new threat became Soviet revolutionaries. Within this new geopolitical environment, intelligence became an increasingly important commodity. The promotion of SOE as an irresponsible and amateurish organisation was, therefore, beneficial to the Secret Services trying to justify their own existence in a post-war world. [42]

The second official history of SOE was not commissioned until 1980. By then, the controversy which had surrounded Foot's *SOE in France* had died down sufficiently to enable Charles Cruickshank to begin work on the organisation's activities in the Far East. In 1986, Cruickshank published the next instalment of SOE's official histories focusing on Scandinavia.[43]

Following the gradual release of SOE's files into the public domain from 1993, a sea-change in the way the organisation was studied occurred. Since then there has been a proliferation in the quantity and quality of popular and academic studies into the organisation. Researchers must, however, 'be reconciled to the fact that the ravages of time and policy have ensured that the archives are unlikely to provide all that is required'.[44] Those files which could have offered a comprehensive assessment of SOE's strategic value have by now been destroyed (see pp. 8-10).[45]

Unsurprisingly, the vast majority of studies into SOE have focused on the 'glamourous' exploits of the organisation's agents abroad. Research into SOE's Country Sections is so firmly entrenched into the mentality of SOE scholars that

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[40] See Malcolm Postgate, *Operation FIREDOG: Air Support in the Malayan Emergency 1948-1960* (London, 1992), Eric Smith, *Malaya and Borneo* (London, 1985), Robert Jackson, *The Malayan Emergency and Indonesian Confrontation: the Commonwealth's Wars 1948-1966* (Barnsley, 2011) and Christopher Bayly, Tim Harper, *Forgotten Wars: the End of British Asian Empire* (London, 2007) and Richard Aldrich 'Legacies of Secret Service: renegade SOE and the Karen Struggle in Burma, 1948-50', *Intelligence and National Security* 14.4 (1999)
[41] Basil Liddell Hart, *Defence of the West: Some Riddles of War and Peace* (London, 1950) pp. 53-7
[42] David Stafford, *Britain and European Resistance 1940-1945* p. 5
[43] Mark Seaman, 'A Glass Half Full …' pp. 34, 35
[44] Ibid p. 40
[45] Michael Foot, 'Was SOE Any Good …' p. 177

there is a danger that topics which do not fit into operational boundaries will be overlooked.[46] It is, however, only with a comprehensive overview of an organisation in its entirety that a balanced assessment can be made. To further our understanding of SOE, scholars have called for 'greater attention … to be given to … non-geographical sections'.[47] This thesis takes as its subject SOE's UK based infrastructure.

The Methodological Approach to Researching SOE's Built Infrastructure

To facilitate the study of SOE's UK based support infrastructure, an interdisciplinary approach has been employed by this thesis. Through a combination of archival research, aerial photographic transcription, architectural surveying and ground based reconnaissance, this study has attempted to negotiate the difficulties posed by relying on SOE's surviving documents.

One of the greatest challenges faced by scholars of the Secret Services is that 'unless a secret service remains secret, it cannot do its work. As it has to remain secret, it ought not to keep any sort of records in the field. Even at its home base, security risks are not needlessly multiplied by putting more than necessary on paper … the traces left for him [the historian] to study are likely to be few'.[48] In the case of SOE, this is compounded by the chaotic nature of the organisation's surviving archive.[49]

The origins of this confusion can be partly attributed to the haphazard nature of the organisation's formation. On the combination of SIS's Section D, Military Intelligence (Research) (MI(R)) and Department EH (see pp. 21-5), SOE failed to establish a central registry.[50] Each section and sub-section was, therefore, responsible for organising their own filing system. In 1945, further confusion was introduced when SOE imposed a top-down approach to departmental filing based on

[46] Christopher Murphy, 'SOE's Foreign Currency Transactions', *Intelligence and National Security* 20.1 (2005) p. 205
[47] Ibid p. 191
[48] Michael Foot, *SOE in France* p. 449
[49] Duncan Stuart, '"Of Historical Interest Only" …' p. 14
[50] Michael Foot, *SOE in France* p. 449

thematic topics. This reorganisation had, however, only just scratched the surface by the time SOE was disbanded in 1946. For a brief period thereafter, a small body of staff were retained to complete this undertaking. When financial support was finally withdrawn, only 25% of the archive had been reorganised. SOE's surviving archive, therefore, comprises of two overlapping, yet incomplete filing systems.[51]

Further challenges faced by SOE scholars are associated with periodic episodes of widespread destruction of the organisation's files. Within the Secret Services, there exists a tendency to avoid record keeping. Only documents deemed operationally essential are favoured for preservation. As the Second World War drew to a close, reports began to circulate of bonfires of documents originating from within SOE's outstations. During these burnings, it is known that significant quantities of files produced by the UK based Special Training Schools (STSs) were also incinerated. There is also a report of a large fire occurring in SOE's Baker Street headquarters in February 1946.[52]

By the middle of 1946, plans were in hand to transfer SOE's remaining files into the care of the SIS. In preparation for this move, it was necessary to reduce the size of the archive. Between August 1946 and May 1947, 119 filing cabinets were, therefore, destroyed (*Table 1*). Of those documents incinerated during this purge, 66% related to the organisation's administration, stores, training and communications. These files predominately dealt with the daily running of SOE in support of their agents aboard. Further episodes of destruction subsequently occurred so that by the 1950s over 87% of SOE's original archive had been lost.[53] By the 1980s, many aspects of SOE's operational history had become public knowledge despite the organisation's archive remaining classified. It was not until 21 October 1993, however, that the first of SOE's files were released to the National Archives (TNA).[54] Selective declassification can, however, distort ones interpretation of the organisation.[55] This process of releasing documents is still ongoing.

[51] Duncan Stuart, '"Of Historical Interest Only" …' pp. 14-5
[52] Ibid pp. 15, 18
[53] Ibid pp. 14, 15, 18, 20
[54] Mark Seaman, 'A Glass Half Full …' pp. 28-9, 36
[55] Nigel Wylie, 'Introduction: Special Operations Executive …' p. 5

Category	Number Destroyed	Percentage of cabinets
Stores and Supplies	20	16.81
Middle East	20	16.81
Signals and Telegrams	14	11.76
Training	14	11.76
Admin and Organisation	11	9.24
Far East	9	7.56
War Diary	9	7.56
French	7	5.88
European Countries General	6	5.04
Scandinavian	3	2.52
Central Europe	2	1.68
Italian	2	1.68
Belgian	1	0.84
Dutch	1	0.84
Total	119	100

Table 1: The number of filing cabinets containing SOE files destroyed between 1946 and 1947.[56]

Over 450 files held by the National Archives were consulted. This was equivalent to approximately 40,000 pages of primary documents. As the post-Second World War destruction of files concentrated on SOE's administrative activities, any study assessing the organisation's UK based infrastructure will inevitably have to rely on the official histories.[57] As these were written as reflective documents, they provide a useful narrative to the organisation's evolution.

Through an in-depth analysis of SOE's surviving archive, this thesis was able to compile a gazetteer of the organisation's UK property portfolio (see Appendix A: Gazetteer). In order to ascertain the current knowledge of these sites, the Ordnance Survey (OS) six-figure grid references for these facilities were checked using the

[56] Duncan Stuart, '"Of Historical Interest Only" …' p. 20
[57] SOE's official histories are located in TNA HS 7.

'Heritage Gateway' website.[58] This database was searched for all records dated between 1939 and 1945 within 1km of the centre point of each of SOE's facilities.[59] The outputs were then consulted for any reference to the organisation. When the results of the HERs and Pastscape were combined, only 6.7% of SOE's UK property portfolio were recorded as such on Heritage Gateway. References to the organisation's facilities were also noted whilst the author undertook research using secondary literature. Based on these, this thesis has increased our knowledge of SOE's UK infrastructure by approximately 32%.[60]

	Number of Sites
Features Visible on 1945 Google Earth	9
No Features Visible on 1945 Google Earth	19
No 1945 Coverage	76
Total Sites Outside of London	69

Table 2: As the gazetteer of SOE sites was compiled, Google Earth historical aerial imagery was consulted for each location. Only 28 of SOE's properties, located outside of London, were covered by this dataset.

During the compilation of the gazetteer, historical aerial imagery from 1945 was consulted (*Table 2*).[61] This data source, which is freely available from Google Earth, enabled a preliminary assessment of the nature of these sites to be conducted. By consulting these images, a rapid and comprehensive initial examination of SOE's property portfolio was achieved. The incomplete nature of Google Earth's 1945 coverage and the poor quality of the reproductions, however, meant accurate surveys could not be undertaken using this data.

Once the initial assessment of SOE's properties had been completed using Google Earth, sites which were identified as of interest were subjected to an in-depth

[58] This online dataset enables information held by Historic England, whose database is known as Pastscape, and the local Historic Environment Records (HER) to be accessed remotely. The author consulted this website in July 2015.
[59] Sites which were located within central London were not consulted. The record returns would have been too large to individually check. As the 'Defence of Britain' (DoB) Database has by now been incorporated into Historic England's Pastscape, this source of data was not searched independently.
[60] See Appendix D: Miscellaneous Data. The author decided not to check SOE's properties which were located in London using Google Earth. Due to the lack of space for construction, it was unlikely that the organisation would have built specific facilities. Building density within London would also restricted the author's ability of identifying features which might have been of SOE origin.
[61] All available historic maps were also consulted.

aerial photographic study. In total, 1,500 images held by the National Monument Record (NMR) in Swindon were consulted. These photographs covered 36 of SOE's facilities which represented 20% of the organisation's property portfolio.[62] As only sites located outside of London were chosen for photographic analysis, this thesis assessed 35% of SOE's country facilities.

When physical or topographical features, associated with activity during the Second World War, were identified on the photographic images, these prints were selected for rectification. The transformations were then carried out using the University of Bradford's Aerial 5.29 photographic rectification program. All digital transformations are, therefore, accurate to within 5m of true ground position and typically less than 2m to the base map. The transcriptions were then produced in AutoCad by tracing features from the transformed and georeferenced aerial images.

Of those sites which were assessed using Google Earth's historical imagery or the NMR's aerial photographs, 69% had no features which could be attributed to SOE. The category of site which was least likely to have purpose built infrastructure visible on historic aerial images, was the organisation's training facilities. In comparison, all of SOE's communication centres contained purpose built structures (*Table 3*).

Site Type	**Features Visible**		**No Features Visible**	
Training	1	3%	30	97%
R&D	3	75%	1	25%
Supply	5	56%	4	44%
Transportation	1	100%	0	0%
Communications	6	100%	0	0%
Total	16	31%	35	69%

Table 3: Of the sites assessed using Google Earth and NMR aerial, only 31% had features visible which could be attributed to SOE.[63]

Despite the general absence of purpose built facilities visible on historic aerial imagery, this methodological approach remains a vital tool in assessing the infrastructure of the Secret Services. Certain properties operated by SOE were found

[62] When possible, these were examined stereoscopically.
[63] See Appendix D: Miscellaneous Data.

to have extensive infrastructure (see Appendix C: Site Plans).Without undertaking a rapid assessment of historical aerial imagery, these might have been overlooked.

Aerial photographic surveys also provide important data for sites which have undergone redevelopment or demolition. For properties belonging to the Secret Services, original site plans are unlikely to be accessible. This source of information might provide the only data relating to these facilities. Historical aerial photographs should, therefore, be a central component to any future study of the infrastructure of the Secret Services.

When features which could be attributed to SOE were identified, every feasible attempt was made to view them from the ground. Time constraints, refusal to access private property and the ephemeral nature of SOE's support infrastructure limited the majority of this thesis to a desk based assessment (DBA).[64] The value and contribution DBAs can make to the study of twentieth century military heritage has been demonstrated numerous times before.[65] Pioneered by English Heritage in the 1990s (see pp. 16-20), this methodological approach can contribute much to our knowledge twentieth century military heritage. DBAs also provide a strong foundation on which future research can be conducted.

At SOE's Station 53B Transmitter Complex at Godington, Oxfordshire, surviving physical remains were identified. Access was also granted for the author to undertake a full architecture survey of the site. This was conducted at a field scale of 1:100 using standard graphical techniques according to guidelines set down by English Heritage. The cross sectional drawing of the main room of the Transmitter Building was formed from a composite created from fixtures observed on individual panels. Access to the roof was not viable due to health and safety considerations. The roofline and any features above were estimated based on ground observations. The survey plan was completed using AutoCad software.

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[64] Based on the findings from this thesis, ground based field checking can now be conducted at sites which have been identified as having a high probability of surviving archaeology. See Appendix D: Miscellaneous Data.

[65] See Colin Dobinson, *AA Command: Britain's Anti-Aircraft Defences of the Second World War* (York, 2001), Colin Dobinson, *Fields of Deception: Britain's Bombing Decoys of World War II* (York, 2013), Colin Dobinson, *Building Radar: Forging Britain's Early-Warning Chain, 1939-1945* (York, 2010), William Foot, *Beaches, Fields, Streets and Hills: The Anti-Invasion Landscapes of England, 1940* (York, 2006), Wayne Cocroft and Derwin Gregory, *Barnham, St Edmunsbury, Suffolk: RAF Barnham, Special Storage Site Documentary Analysis of Sources in the National Archives* (Swindon, 2011), Derwin Gregory, *RAF Stanbridge, Leighton Buzzard, Bedfordshire: Desk Based Assessment* (Swindon, 2011) and Linda Monckton, Andrew Williams, Imogen Grundon, Nathalie Barrett and Kathryn Morrison, *Bletchley Park, Buckinghamshire, Architectural Investigation Report* (Swindon, 2004).

The thesis' multidisciplinary approach, incorporating archaeological and historical methodologies, was the only viable method for assessing the infrastructure of one of the British Secret Services. In studies where a gazetteer of sites has yet been assembled, it is inevitable that primary sources are a central component of the research. It is only through extensively studying an organisation's primary documents that it is possible to compile a database of facilities.[66] This information is unlikely to be found elsewhere. Without access to SOE's surviving archive, this thesis would not have been possible.

Although the primacy of the organisation's primary documents to this study is evident, not all information could be obtained from this source. Archives containing papers associated with the military during the twentieth century are often incomplete, restricted or chaotic in nature. In these situations, the physical infrastructure offers an independent source of information against which the accuracy of the archives can be assessed. By examining the archaeological record, change of function, adaptions and phases of construction, for example, can be determined. Although these events might also be recorded in the archives, outcomes can differ from intentions. Infrastructure, therefore, provides a physical representation of the actions of an organisation.

It is essential that any future studies on the infrastructure of the Secret Services utilises a multidisciplinary approach incorporating historical and archaeological methodologies. Extensive primary documentary research enables a gazetteer of sites to be complied. Archaeological techniques can then target sites which have been identified in the archives. It is only through the combination of these two disciplines that a holistic assessment of the organisation can be achieved.

Built to Resist: Thesis Structure

To effectively relate the results of this study, this thesis has been arranged into thematic chapters. Each chapter addresses a specific function of SOE's UK based support infrastructure. In Chapter II, the historical context in which this thesis

[66] For some of SOE's smaller properties, the only reference to them might be in the heading of a correspondence. Without extensively examining the organisation's archive, these facilities might have been overlooked.

sits will be presented. The origins of SOE's formation will briefly be examined as will the organisation's internal hierarchy. Central figures within SOE's history will also be introduced and the organisation's operational procedure examined.

The order of this thesis then reflects a logical progression through SOE as the organisation prepared agents and equipment for operations. In Chapter III, the infrastructure of SOE's training facilities will be examined. Due to the nature of this training, any purpose built equipment was of an ephemeral nature. This chapter, therefore, is reliant on SOE's surviving archive. By examining the organisation's syllabuses, it will be demonstrated that, when required, SOE devised innovative training facilities which integrated intelligence gathered from the field.

On the formation of SOE in July 1940, it rapidly became apparent that equipment specifically designed for clandestine warfare was essential to the organisation. Chapter IV will examine the organisation's heavy investment in devising a wide range of innovative and deadly equipment. Once these new items had been designed, it was essential that they were manufactured and prepared for transportation. Chapter V will examine the breadth of SOE's supply chain.

In order to deliver supplies to the field, it was essential that SOE established transportation links with occupied Europe. Chapter VI assesses the organisation's changing relationships with the RAF and the Royal Navy through the nature of SOE's transportation hubs. To arrange for these supplies to be delivered to where they were required, it was essential that SOE could communicate with their agents in the field. Chapter VII demonstrates that once the organisation gained control of their wireless networks in 1942, SOE invested in state-of-the-art facilities. To effectively run the organisation, it was essential that SOE established an efficient command and control infrastructure. Chapter VIII will examine this aspect of the organisation and demonstrate that SOE was controlled from London. In Chapter IX, wider notions of the archaeology of clandestine warfare and the Secret Services will be discussed. This thesis will then be drawn to an end with Chapter X which will conclude the major findings of this study.

CHAPTER II
Historical and Archaeological Context

To provide historical context for this thesis, this chapter will examine SOE's formation, the characters central to establishing and running the organisation and its internal hierarchy. In order to appreciate the range of facilities required by SOE, it is essential to have some prior understanding of the nature of their operations. This will be presented in this chapter along with an outline of the facilities inherited by the organisation on its formation. Although some of this has been covered by more distinguished scholars, the following synthesis provides the context in which SOE's property portfolio can be assessed.[1] First, however, the archaeological context in which this thesis sits will be discussed. This will provide an important overview of the development of modern conflict archaeology as a discipline.

Archaeological Context

Even before the Treaty of Versailles had been signed ending the First World War, the historical value of military material culture was already being recognised. Whilst fighting was still going on, depots were established in France to collect artefacts for what was to become the Imperial War Museum. Shortly after the Armistice, the first tourists also began visiting the battlefields. These initial visitors were, however, driven by acts of commemoration and remembrance rather than historical curiosity.[2]

During the inter-war period, the significance of military monuments from the recent past was beginning to be recognised. Prior to the outbreak of the Second World War, discussions over whether to provide First World War gun emplacements

[1] See Michael Foot, *SOE in France* (London, 1966), William Mackenzie, *The Secret History of SOE: Special Operations Executive 1940-1945* (London, 2000), Michael Foot, *SOE: The Special Operations Executive* 1940-46 (London, 1993), Nigel West, *Secret War: The Story of SOE: Britain's Wartime Sabotage Organisation* (London, 1992), David Stafford, *Britain and European Resistance 1940-1945: A Survey of the Special Operations Executive with Documents* (London, 1980) and Charles Cruickshank, *SOE in Scandinavia* (Oxford, 1986).
[2] John Schofield, *Modern Military Matters: Studying and Managing the Twentieth-Century Defence Heritage in Britain: A Discussion Document* (York, 2004)

with statutory protection had been initiated. Although these deliberations were unsuccessful, the value and significance of modern military infrastructure had, however, been appreciated.

It was not until the 1960s and 1970s, however, that the first study into twentieth century military structures occurred. This coincided with a period of increasing leisure time and a greater interest within sections of society towards archaeology. It was during this period that amateur archaeologists began the first sustained surveys of aspects of Second World War heritage. Out of this research came the publication in 1985 of Henry Wills' book 'Pillboxes'.[3]

By the late 1980s, professional archaeologists had also begun showing an interest in this field of study.[4] This coincided with the development of archaeological resource management and the need to 'value, prioritise and manage our cultural heritage'.[5] Finally in the 1990s, the first projects to record twentieth century military remains were initiated: studies were undertaken by the Royal Commissions in England, Wales and Scotland.[6] This coincided with Historic Scotland commissioning a number of regional assessments of the survival of twentieth century defences.[7] During this period, Roger Thomas was also employed to study the military remains located in Pembrokeshire.[8]

In 1994, the Royal Commission on the Historic Monuments of England undertook the first dedicated archaeological survey of a twentieth century military site.[9] The focus of this study, a Second World War Heavy Anti-Aircraft Battery, was also one of the first sites to be scheduled under English Heritage's Monuments Protection Programme. During the same year, all the effort from the preceding decades culminated in two national initiatives: the Defence of Britain (DoB) Project and a series of related studies commissioned by English Heritage.[10] In 1996, English Heritage also commissioned the CBA to undertake a 'survey of documentary records

[3] See Henry Wills, *Pillboxes: A Study of UK Defences* (London, 1985)
[4] John Schofield, *Modern Military Matters* p. 3
[5] Ibid p. 3
[6] See RCAHMS, *Catalogue of the Luftwaffe Photographs in the National Monuments Record of Scotland: Scotland from the Air, 1939-49* Vol. 1 (Edinburgh, 1999a) and RCAHMS, *Catalogue of the Luftwaffe Photographs in the National Monuments Record of Scotland: Scotland from the Air, 1939-49* Vol. 2 (Edinburgh, 1999b)
[7] John Schofield, *Modern Military Matters* p. 3
[8] Roger Thomas, *Survey of 19th and 20th century military buildings of Pembrokeshire* (Unpublished Report, 1994)
[9] See RCHME, *Bowaters Farm Survey* (Unpublished Report, 1994)
[10] These projects were later extended to cover the whole of the United Kingdom (John Schofield, *Modern Military Matters* p. 3).

for 20th century fortifications'.[11] This decade also saw national heritage agencies beginning to highlight the recent history of properties in their care. The sites at the forefront of this were Dover Castle, Kent, and Fort George, Inverness.[12]

The national surveys which were conducted during the 1990s initially focused on analysing the documentary records. This enabled the researchers to quantify the original site population. By achieving this, the necessary data was available to assess the survival and preservation of sites.[13] The surveys, therefore, provided a baseline from which future studies could build. This initial research also enabled subsequent fieldwork to be undertaken in a more structured and systematic way.[14]

It was not until 2003 that the first study on the monuments of the Cold War was published. This project, undertaken by Wayne Cocroft and Roger Thomas and commissioned by the Royal Commission on the Historical Monuments of England,[15] represented the first time many of these facilities were available to study. Prior to the publication of this work, monuments of the Cold War were poorly understood and badly represented in the NMR. Unlike the previous studies commissioned by the national heritage agencies, this project focused on the physical sites. As the primary records were still restricted, it was inevitable that the military infrastructure was the main source of information.[16]

As has been discussed, the utilisation of the built heritage as a source to study the contemporary past is not a new methodological approach.[17] Although this thesis

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[11] Colin Dobinson, *Twentieth Century Fortifications in England Volume I.I Anti-Aircraft Artillery, 1914-46* (Unpublished Report, 1996a) p. xi

[12] John Schofield, *Modern Military Matters* p. 3

[13] Without undertaking these documentary surveys, the cultural significance of these sites could not be assessed.

[14] John Schofield, *Modern Military Matters* p. xi

[15] The project was commissioned by the Royal Commission on the Historical Monuments of England and completed under English Heritage.

[16] Wayne Cocroft and Roger Thomas, *Cold War: Building for Nuclear Confrontation 1946-1989* (Swindon, 2004) p. 2

[17] See John Schofield, *Combat Archaeology: Material Culture and Modern Conflict* (London, 2005), John Schofield, *Modern Military Matters*, John Schofield, William Johnson and Colleen Beck (ed.), *Materiel Culture: The Archaeology of Twentieth Century Conflict* (London, 2005), Nicholas Saunders (ed.*), Beyond the Dead Horizon: Studies in Modern Conflict Archaeology* (Oxford, 2012), Trevor Rowley, *The English Landscape in the Twentieth Century* (London, 2006), David Passmore and Stephan Harrison, 'Landscapes of the Battle of the Bulge: WW2 Field Fortifications in the Ardennes Forests of Belgium', *Journal of Conflict Archaeology* 4.1-2 (2008), John Schofield and Wayne Cocroft, 'The Secret Hill: Cold War Archaeology of the Teufelsberg', *British Archaeology* 126 (2012), Linda Monckton, Andrew Williams, Imogen Grundon, Nathalie Barrett and Kathryn Morrison, *Bletchley Park, Buckinghamshire* (Swindon, 2004), Wayne Cocroft and Roger Thomas, *Cold War*.

employs a tried and tested methodology, this is the first time it has ever been applied to the entire property portfolio of one of Britain's Secret Services. By undertaking this research, the true extent of SOE's infrastructure can, for the first time, be comprehended.

Dates	**Age**	**Evidence**
1974-2004	Prehistoric	Archaeological evidence No access to oral history (Official Secrets Act) No access to documents (30 year rule)
1934-1974	Modern	Archaeological evidence Oral history Primary sources
1900-1934	Historic	Archaeological evidence No oral histories (except those previously recorded) Primary sources

Table 4: The 'ages of war'.[18]

Despite being a 'text aided period', documents relating to the military in the twentieth century can be problematic to access. It is helpful, therefore, to view this period using Schofield's 'ages of war' (*Table 4*). Retention of 'sensitive' files, the upholding of the Official Secrets Act and the heavy censoring of declassified documents can significantly impact the validity of academic research. The act of staggering the release of key documents can also lead to an imbalance in the archives of intentions verses outcomes.[19] In situations where 'documents and oral historical evidence are not available, [material culture] ... provides a viable alternative'.[20]

[18] John Schofield, *Combat Archaeology* p. 39
[19] Ibid pp. 35, 37, 39
[20] Ibid p. 37

Figure 1: Magazine at the Office of Strategic Service's (OSS) 'Area H'. The extensive vegetation growth within this facility has resulted in the rapid deterioration of the surviving structures.[21]

Although the Secret Services can be regarded as 'prehistoric', they also sit across Schofield's classifications. SOE can simultaneously be placed within the prehistoric, historic and modern categorisations. It is, therefore, essential that all sources of information are utilised when studying the Secret Services. The nature of SOE's infrastructure has inevitably meant this thesis has had to rely on the organisation's surviving documentary records. Without this archive, the full extent of SOE's infrastructure could not have been determined. As will be demonstrated, infrastructure associated with the Secret Services is only unique when it fulfils a specific role exclusive to that organisation. Built heritage alone cannot always determine a site's association with the Secret Services during the Second World War. It is only through archival research that this can be confirmed. Due to the rapidly deteriorating state of 'temporary' wartime structures, this research into SOE's infrastructure is timely (*Figure 1*).

[21] Author 2012

SOE's Historical Context

On 27 September 1938, the British Cabinet took the important decision to organise a Department of Propaganda to Enemy Countries. To run this new organisation, Whitehall approached Sir Campbell Stuart.[22] Previously, Stuart had been responsible for controlling the British propaganda effort during the final years of the First World War.[23] With the signing of the Munich Agreement three days later, the British Government postponed the formation of this new organisation. It was not until 23 December 1938, when Stuart was appointed chairman of the propaganda sub-committee of the Committee of Imperial Defence, that the issue was once again raised.[24]

On 3 April 1939, Stuart moved his operations into Electra House,[25] Victoria Embankment, which also housed the Imperial Communications Advisory Board.[26] It was from this new accommodation that Stuart's Department EH inherited its name.[27] Prior to their mobilisation on 1 September 1939, the department existed on a purely informal basis with no Treasury grant. At the outbreak of hostilities, 60 members of Department EH's staff immediately relocated to offices in the Riding School at Woburn Abbey.[28]

At the start of the Second World War, duplication of Department EH's remit was unknowingly being undertaken by a section within SIS.[29] In 1938, SIS established Section D and tasked it with researching subversive methods of warfare and investigating 'every possibility of attacking potential enemies by means other than the operations of military force'.[30] By 5 June 1939, Section D was already experimenting with clandestine propaganda.[31] In parallel to the work being

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[22] Eric Howe, *The Black Game: British Subversive Operations against the Germans during the Second World War* (London, 1988) p. 36
[23] Duncan Stuart, '"Of Historical Interest Only": The Origins and Vicissitudes of the SOE Archive', *Intelligence and National Security* 20.1 (2005) pp. 9, 10
[24] Eric Howe, *The Black Game* p. 36
[25] Eric Howe, *The Black Game* p. 38
[26] Sir Campbell was the chairman of the Imperial Communications Advisory Board.
[27] David Garnett, *The Secret History of PWE: The Political Warfare Executive 1939-1945* (London, 2002) pp. 9-10
[28] Eric Howe, *The Black Game* pp. 38, 40
[29] Michael Foot, *SOE* p. 5
[30] TNA HS 8/305 Recommendations with regard to the control of 'Extra-Departmental' and 'Para-Military' activities p. 2
[31] Subversive propaganda, also known as 'grey' and 'black' propaganda, was material which could not be acknowledged by the British Government. This was material which pretended to originate from

undertaken on propaganda, Section D was also examining the prospect of undertaking raids on enemy installations. Operational plans had been devised for the seizure of oil-wells in Romania and disrupting the enemy's vital communications immediately following the outbreak of war.[32] By the end of the month, SIS staff, operating under the cover of the British Embassies' Passport Control Offices, were informed that there existed a 'centrally controlled organisation which is already equipped with arms and explosives, and prepared for action at ten days' notice'.[33]

Section D had, however, been preceded by two years by a similar department within the War Office. Established in 1936, the War Office's General Staff (Research) (GS(R)) only comprised of a major from the Army Education Corps and his typist for the first two years of its existence. In 1938, Major Jo Holland RE took over the post. Deciding to concentrate his meagre resources on researching unorthodox methods of warfare, Holland focused his efforts on examining Boer tactics, Lawrence of Arabia, the Russian and Spanish Civil Wars and the British experience in Ireland. Following the War Office splitting operations and intelligence into two new departments in the spring of 1939, GS(R) was renamed Military Intelligence (Research) (MI(R)).[34]

By the middle of the winter of 1939, discussions between Section D and MI(R) were ongoing as to the future division of labour between the two competing organisations. Eventually, it was agreed that MI(R) would focus on operations which could be undertaken by troops in uniform, whilst Section D would devise procedures which could not be officially acknowledged.[35] This distinction was not, however, always clear to military commanders. In January 1940, the Czechoslovakian Chief of Staff, Colonel Hutnik, requested MI(R) supply his agent in Belgrade with explosives intended to sink German barges stuck in ice on the Danube.[36] Although MI(R) were concerned that this 'business is really D's pigeon, and not an M.I.R. matter, but as the Chief of Staff came to me officially about it, we must take it up and pass it on'.[37]

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within the country it was intended for. By indicating that it was produced by their compatriots, the recipient of the propaganda was less likely to dismiss it right away.

[32] TNA HS 8/305 Recommendations with regard to the control of 'Extra-Departmental' and 'Para-Military' activities pp. 2-3

[33] TNA HS 4/31 Notes on Para-Military Activities 24/06/1939 p. 1

[34] Michael Foot, *SOE* pp. 5-6

[35] Ibid p. 7

[36] TNA HS 4/31 L.2/M/P/3 p. 2

[37] Ibid pp. 2-3

As early as 25 May 1940, the Chiefs of Staff had foreseen the collapse of France.[38] In this situation, the creation of widespread revolt within German occupied territories was to become a major British strategic objective. The overlapping roles of Department EH, Section D and MI(R) inevitably led to infighting over who should retain responsibility for clandestine warfare in this scenario. Lord Hankey, the first formal secretary of the cabinet, was charged with facilitating a settlement. At a meeting held on 13 June 1940, Hankey persuaded Major Grand, head of Section D, and Holland that raiding and subversion had to be co-ordinated by a single ministry.[39] This was confirmed on 1 July when Lord Halifax,[40] Lord Hankey, Lord Lloyd,[41] Dr Hugh Dalton,[42] Sir Alexander Cadigan,[43] Gladwyn Jebb,[44] Sir Stewart Menzies,[45] the Director of Military Intelligence (DMI) and Sir Desmond Morton[46] agreed that subversive warfare needed to be controlled by a single body with 'dictatorial' powers.[47] The following day, Dalton wrote that:

> 'We have got to organize movements in enemy-occupied territory comparable to the Seinn Fein movement in Ireland, to the Chinese Guerrillas now operating against Japan, to the Spanish Irregulars who played a notable part in Wellington's campaign or – one might as well admit it – to the organizations which the Nazis themselves have developed so remarkably in almost every country in the world. This "democratic international" must use many different methods, including industrial and military sabotage, labour agitation and strikes, continuous propaganda, terrorist acts against traitors and German leaders, boycotts and riots'.[48]

[38] This was only 15 days after Germany had launched *Blitzkrieg* against France.
[39] Michael Foot, *SOE* pp. 16, 17
[40] Foreign Secretary
[41] Colonial Secretary
[42] Minister of Economic Warfare
[43] Permanent Secretary for Foreign Affairs
[44] Private secretary to the Permanent Secretary for Foreign Affairs
[45] C, head of SIS
[46] The Prime Ministers civil assistant who handled Churchill's relations with the Secret Service.
[47] Michael Foot, *SOE* p. 18
[48] Ibid p. 18

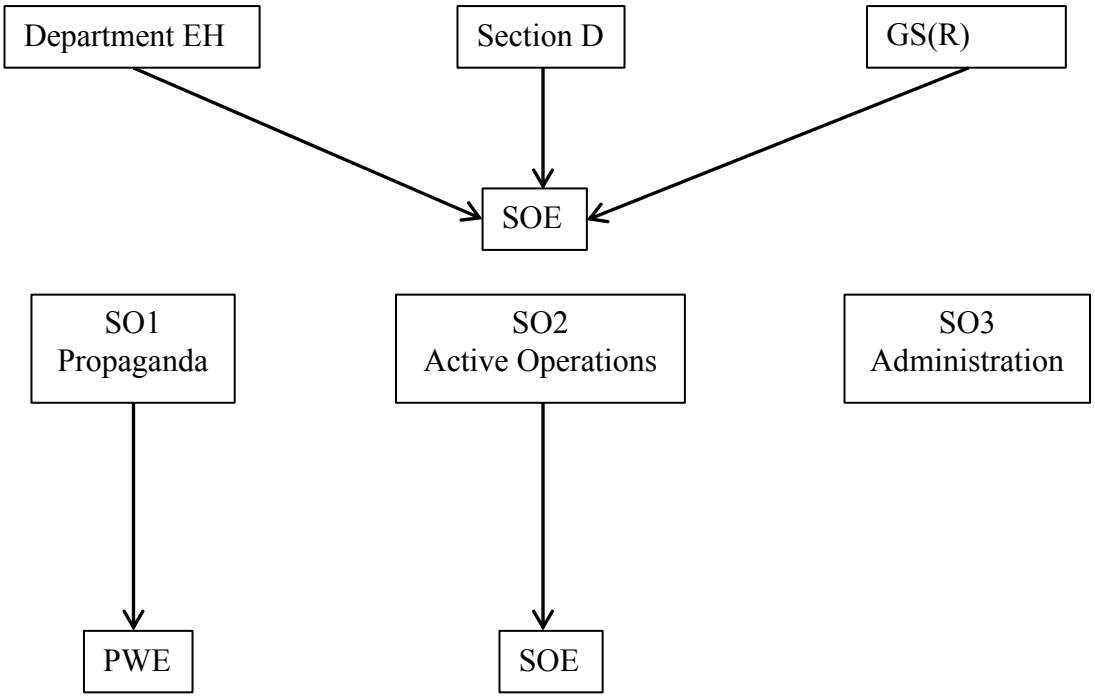

Figure 2: The history of SOE's formation in July 1940.[49]

On 10 July, Lord President of the Council, Neville Chamberlain, presented SOE's founding Charter to the War Cabinet. Six days later, Prime Minister Winston Churchill invited Dalton to take charge of the new body.[50] The charter was approved on 22 July and Section D, MI(R) and Department EH were subsequently amalgamated into SOE (*Figure 2*).[51]

In the month following SOE's formation, Dalton appointed Sir Frank Nelson the task of running the daily operation of the organisation. Nelson and Dalton, supported by Jebb, who was there to report back to Halifax on Dalton, immediately dismissed Grand. The new organisation was arranged into three branches: SO1 responsible for propaganda, SO2 for active operations and SO3 for planning and administration.[52]

Interdepartmental rivalries over who should control propaganda continued despite the formation of SOE. Internally, both SO1 and SO2 maintained the right to undertake 'covert' propaganda.[53] Concerns were also raised as to whether it was feasible to divorce covert from overt propaganda, the latter being the responsibility

[49] Author's diagram.
[50] TNA HS CAB 301/51 Report to the Minister of Economic Warfare on the Organisation of SOE p. 1
[51] William Mackenzie, *The Secret History of SOE* p. 69
[52] Michael Foot, *SOE* p. 23
[53] Clandestine propaganda involved 'black' and 'grey' activities which were intended to deceive the recipient as to the origin of the material.

of the Ministry of Information (MoI).[54] Eventually, it was decided to form a new independent executive under tripartite Ministerial leadership. Operational control of the Political Warfare Executive (PWE) was to be entrusted to Robert Bruce Lockhart whilst the ministers in charge were Sir Anthony Eden, Foreign Office (FO), Dalton, Ministry of Economic Warfare (MEW) and Brendon Bracken, MoI.[55] On 12 September 1941, Churchill announced to Parliament that PWE had been established which formally split SOE in two.[56]

SOE's Central Characters

In the turbulent history of SOE, there are a number of key figures who deserve specific mention.[57] One of the greatest and most important figures in the history of the organisation was Winston Churchill. On various occasions it was only through Churchill's influence that SOE survived attacks by her sister organisations. Fascinated by the 'cloak-and-dagger' world of the Secret Services, Churchill was no stranger to clandestine activities. Early in his early career, he had been shot at by Cuban guerrillas and escaped from a Boer prisoner-of-war camp.[58] As Home Secretary, he had also been involved in the creation of Britain's intelligence community and ensured Vernon Kell, head of its counter-espionage section, which later became MI5, was provided with surveillance equipment.[59]

Whilst employed at the Admiralty during the early stages of the Second World War, Churchill became aware of a plan by Section D to seize Swedish ore fields. Prime Minister Neville Chamberlain and the Cabinet were, however, dragging their feet over giving permission to initiate the operation. Losing patience, Churchill summoned Grand to the Admiralty and demanded an explanation for the delay. On hearing Grand's version of events, Churchill cornered Chamberlain and persuaded

[54] David Garnett, *The Secret History of PWE* p. 81
[55] Eric Howe, *The Black Game* p. 50
[56] David Garnett, *The Secret History of PWE* p. 72
[57] One of the common criticisms of an archaeological methodology is that it leaves the people out. To ensure that this thesis is seen within the context of its human agency, an appreciation of the central figures behind the formation and running of SOE is essential.
[58] Controversy surrounded he escape as stories began to circulate that he had left two of his companions behind so that he could make his escape. See John Charmley, *Churchill: The End of Glory* (London, 1993) p. 24
[59] David Stafford, *Churchill and Secret Service* (London, 1997) pp. 4, 7

him to lift the veto against the mission. The disastrous ineptitude of Section D's subsequent operation was to reflect both badly on them and SIS. With the enduring memory of bureaucratic procrastination, it took Churchill only two months, after becoming Prime Minister, to establish SOE as an independent executive. His lifelong interest in unorthodox warfare ensured that the European Resistance was supported throughout the war. This network, under the control of SOE, remained a beacon of hope for those living under German occupation.[60]

It was the responsibility of Desmond Morton, an SIS officer who had fed Churchill intelligence throughout the 1930s, to act as the conduit between the Prime Minister and the Secret Services.[61] Morton's close connection with SIS meant that he was only too eager to draw Churchill's attention to SOE's failures.[62] Despite his personal bias, the Prime Minister still tasked Morton with ensuring the survival of the fragile peace which existed between SOE and SIS.[63]

At the head of SIS throughout the Second World War was Sir Stewart Menzies, also known as 'C'. This position had previously been held by Sir Hugh Sinclair who died on 4 November 1939. Two days prior to his death, Sinclair had written a letter pressing the case for his deputy Menzies to be his successor. With various suitable candidates in the running for the position, it took until 28 November for the Prime Minister, the armed forces and the Foreign Secretary to come to an unanimous agreement in favour of Menzies. Despite knowing little about intelligence gathering, Menzies was, however, a shrewd bureaucrat. Without the responsibility of disseminating GCCS's ULTRA decrypts, it was highly unlikely that Menzies would have kept his position. Whilst head of SIS, he managed to forge strong alliances with the Foreign Office who agreed that SOE would only ever be a wartime organisation.[64]

Menzies' opposite number in SOE, known as 'CD', changed three times over the course of the Second World War. On being appointed minister in charge of SOE, Dalton's first task was to find a strong man to take operational control of the new executive. Originally Dalton had intended to give the position to Brigadier General Sir Edward Spears. He was, however, passed over in favour of Sir Frank Nelson, a

[60] David Stafford, *Churchill and Secret Service* pp. 173, 188
[61] Ibid pp. 6, 237-8
[62] David Stafford, *Britain and European Resistance 1940-1945* p. 151
[63] David Stafford, *Churchill and Secret Service* pp. 6, 237-8
[64] Keith Jeffery, *MI6: The History of the Secret Intelligence Service 1909-1949* (London, 2010) pp. 328, 331, 742

56 year old former Indian merchant and seven year Conservative backbencher. This choice gained C's approval.[65]

In February 1942, Dalton was removed as Minister of Economic Warfare and replaced by Lord Selborne. Almost immediately, Selborne noticed that Nelson was no longer fit to continue as CD. His deputy, Sir Charles Hambro had already proven his capabilities and replaced Nelson in April 1942. Before joining SOE, Hambro had had a varied career which included working as a merchant banker and acting as the director of the Bank of England. Following his appointment, Selborne and Hambro arranged to meet on a daily basis. This allowed the minister to keep abreast of SOE's activities which enabled him to support the organisation politically.[66]

This close relationship did not last long and eventually the pair fell out. The key area of contention was Hambro's preference for maintaining SOE's independence. He was also keen on keeping Selborne at arm's length from the organisation's operational procedures. Following a ministerial meeting in which Selborne was humiliated as Hambro had withheld important information, the decision was taken to find a new CD. In September 1943, Major Colin Gubbins was appointed as Hambro's replacement.[67] Joining MI(R) in 1939, Gubbins had been involved in the Norwegian Campaign and been a central figure in establishing Britain's resistance network, the Auxiliary Units.[68] He was, therefore, the ideal candidate for the position. As Gubbins was a regular soldier, he also agreed with Selborne that in a conflict zone, SOE should be sub-servant to the battlefield commander.[69] Gubbins was to remain CD for the remainder of the war.

[65] Michael Foot, *SOE* pp. 18, 22-3
[66] Ibid pp. 37-8, 39-40
[67] Michael Foot, *SOE* pp. 40-1
[68] Peter Wilkinson and Joan Astley, *Gubbins and SOE* (Barnsley, 2010) pp. 34, 50, 69
[69] Michael Foot, *SOE* pp. 40-1

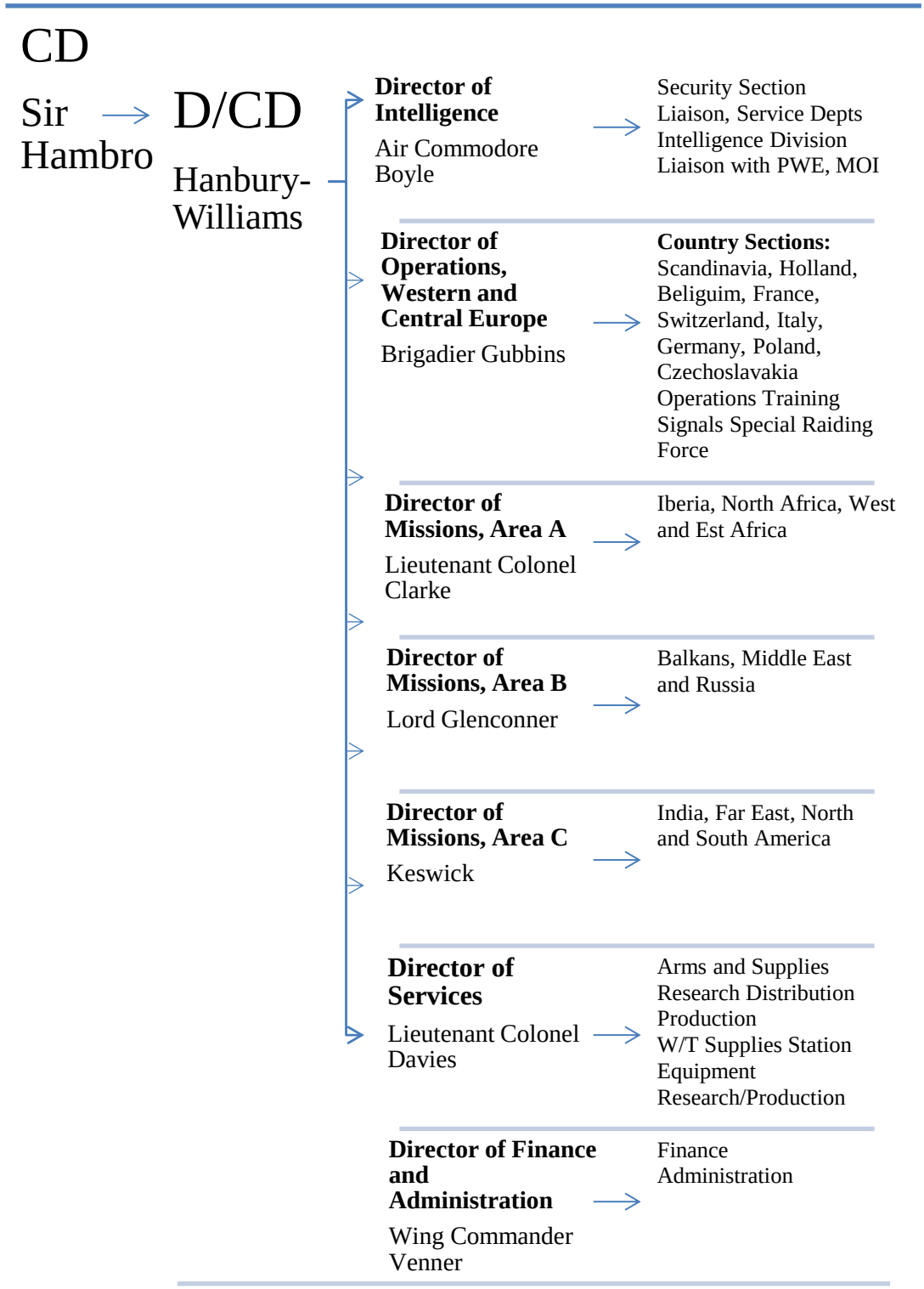

Figure 3: SOE's internal organisation in the summer of 1943. Over the duration of the Second World War, this hierarchy underwent various alterations. This figure, however, illustrates the various sections established within the organisation.[70]

[70] TNA HS 8/965 SOE Internal Organisation Summer 1943

SOE's Internal Organisation

Over the course of the Second World War, SOE's internal hierarchy underwent various alterations. Despite these reorganisations, the basic structure remained relatively consistent (*Figure 3*).

Operational control of SOE was in the hands of CD directly under who was his deputy, D/CD. The organisation was then arranged into seven sections whose functions included dealing with security, liaison, research and development, supplies, finance and administration. Sub-sections which dealt daily with activities within mainland Europe were known as the Country Sections. These sub-sections were tasked with recruiting and arranging the training of their own agents. It was also the responsibility of Country Sections to coordinate, arrange and undertake operations in mainland Europe.

SOE's Operations

On 14 June 1940, Dalton advocated the establishment of a 'democratic international'. The function of this organisation would be to coordinate all acts of subversion and sabotage against the enemy overseas. This idea was to eventually become SOE. Throughout the Second World War, the organisation was involved in undertaking a wide range of clandestine operational activities. These included sabotage, assassination, intelligence gathering and coordinating the activities of indigenous resistance networks.

One of SOE's most famous acts of sabotage was undertaken as part of Operation GUNNERSIDE. On 16 February 1943, Lieutenant Joachim Ronneberg, Captain Knut Haukelid and Privates Fenriks Fredrik Kayser, Kasper Idland, Hans Storhaug and Birger Stromsheim from the Norwegian Independent 'Linge' Company parachuted onto the frozen Bjarnesfjord, Norway. Their task was to attack the Norsk Hydro Plant, Telemark.[71] Lying in a remote valley 150 miles west of Oslo, this factory was the world's largest producer of heavy water. As an essential element in

[71] Charles Cruickshank, *SOE in Scandinavia* p. 199

controlling nuclear reactions, the German order that the plant should increase its output to 10,000lbs (4,536kg) per annum was a strategic concern to the British.[72]

Attempts by Combined Operations to insert troops into Norway to destroy the factory failed in November 1942. Following this disaster, SOE was tasked with the next operation.[73] As local defences had been strengthened, the sabotage team decided the only way to access the factory was via the sheer cliff face atop which the plant had been constructed. Entering the compound on the night of 28 February, the demolition parties entered the facility and set their charges within the electrolysis chamber without raising the alarm.[74] This operation was a clear success for clandestine warfare.

Sabotage was not the only 'ungentlemanly' activity undertaking by SOE. One of the most audacious plots devised by SOE was that of Operation FOXLEY. In the summer of 1941, Section X, the German Country Section, was given the green light to begin assessing the feasibility of assassinating Hitler. It took them until the autumn of 1944 to accumulate the intelligence necessary to contemplate undertaking a serious attempt on Hitler's life. The methods they devised included infiltrating snipers into the vicinity of the Berghof, RAF bombing raids and targeted biological weapons. Debates surrounding the strategic value of assassinating Hitler continued until his suicide on 30 April 1945.[75]

Whilst undertaking their allocated missions, SOE's agents were also required to pass on all intelligence collected in the field to SIS. In certain regions, the resistance were the only allied forces operating and were, therefore, the sole source of SIS's information.[76] One of the most successful intelligence collaborations between SOE, SIS and the European Resistance was Operation MOST III.[77] In the spring of 1944, a V2 rocket fired from a test range near Blizna, Poland, fell into the bank of the River Bug. Discovered by the Polish Home Army, the rocket was quickly hidden before the Germans could reclaim it. On being disassembled, the components were smuggled into Warsaw where scientists managed to extract the fuel and send samples back to London. SIS was determined to see the rocket and in

[72] Ray Mears, *The Real Heroes of Telemark: The True Story of the Secret Mission to Stop Hitler's Atomic Bomb* (London, 2003) p. 9
[73] Fredric Boyce and Douglas Everett, *SOE* p. 252
[74] Ray Mears, *The Real Heroes of Telemark* pp. 151, 152, 153, 159, 160, 161, 162, 163, 164
[75] Denis Rigden, *Kill the Fuhrer: Section X and Operation FOXLEY* (Stroud, 2002) pp. viii, ix, 2, 3
[76] TNA HS 8/901 SIS and SOE F/3491/134.1 31/03/1942 p. 3
[77] Operation MOST III was the Polish name for Operation WILDHORN III.

collaboration with SOE and Polish intelligence they arranged for it to be airlifted to the UK in July 1944.[78] Operation MOST III demonstrated that the strategic value of the resistance could be enhanced if their activities were coordinated. Arranging for the airlift could only be undertaken with efficiently and reliably communicate with the networks on the ground. To achieve this, SOE embedded wireless operators within the resistance.

In order to ensure the resistance were working towards strategic objectives and not their own personal agendas, SOE also inserted their own commanders into local networks. These agents were specially trained in the art of clandestine warfare and could ensure a more professional organisation answered to the allies. The operational procedures and the agents' roles necessary to embed within the resistance took time to identify. Some of these techniques and skills were, however, inherited from the organisation's predecessors.

SOE's Origins: The Facilities of MI6's Section D, MI(R) and Department EH

On the formation of SOE in July 1940, the organisation inherited a foundation on which to build. The organisation had been created from the amalgamation of Section D, MI(R) and Department EH. Although the activities of these organisations were limited in scope, they had begun developing operational procedures and clandestine equipment. In order to achieve this, it was essential they established their own property portfolio. On the formation of SOE, a number of these facilities were passed to the new organisation. From this small foundation the new clandestine body rapidly expanded their property portfolio to meet their increasing global demands.

[78] Tessa Stirling, Daria Nalecz and Tadeusz Dubicki (eds.) *Intelligence Co-operation between Poland and Great Britain during World War II* (Edgware, 2005) p. 441

Section D

Section D's first headquarters were established in 2 Caxton Street, London. This grand Victorian red-brick, hotel was conveniently located for the infant section being a mere 100m south of SIS's HQ in Broadway Buildings (*Figure 4*).[79] One of the first 'operational' facilities occupied by this section was SIS's communal accommodation at Bletchley Park (*Figure 5*). By mid-1939, the organisation had constructed a small magazine for explosives and incendiaries in the grounds. These facilities enabled Section D to initiate full-scale experiments with primitive sabotage weapons. [80] With war appearing imminent, the section saw the need to expand their property portfolio. On 26 August 1939, the hotel staff of The Frythe, Welwyn, were informed that the building was being requisitioned. Section D quickly acquired the use of this property to accommodate their wireless research department.[81]

Figure 4: St Ermin's Hotel, 2 Caxton Street, the first headquarters of SIS's Section D.

[79] William Mackenzie, *The Secret History of SOE* p. 13
[80] TNA HS 7/27 History of the Research and Development Section of SOE p. 3
[81] Fredric Boyce and Douglas Everett, *SOE* p. 15

With war declared on 1 September 1939, Section D's five officers at Bletchley Park were forced out by the rapidly expanding Government Code and Cypher School (GCCS). Two months later, Section D's research section relocated to Aston House, Stevenage. The function of this new facility was expanded from merely research and development to also include manufacturing and storage of equipment. To facilitate this, machine and carpenters' shops were constructed in the grounds. In order to prepare and pack explosive charges, a miniature filling factory was also erected. It was not long before the storerooms at Aston House were holding several tons of high explosives and incendiaries. The *ad hoc* training of saboteurs was also conducted within the grounds of this facility.[82]

Figure 5: Bletchley Park, home to Section D until lack of space forced them to relocate to Aston House. Within the grounds, Section D constructed magazines. The facility was also used to conduct experiments with sabotage weaponry.

It took Section D until June 1940, however, to establish a specific industrial sabotage school.[83] Known as Station XVII and located at Brickendonbury, Hertfordshire, this facility was run by Commander Peers, RN. The instructional staff included Major Hill, Mr Philby, Mr Burgess and Professor Paterson whose aim was to train European exiles to act as instructors and recruiters. On returning to mainland Europe, these agents would be able to raise resistance networks and commit specific

[82] TNA HS 7/27 History of the Research and Development Section of SOE pp. 3, 4, 5
[83] Bernard O'Connor, *RAF Tempsford: Churchill's Most Secret Airfield* (Stroud, 2010) p. 19

acts of sabotage.[84] Despite the limited size of Section D's property portfolio, The Frythe, Aston House and Brickendonbury, were all to become important centres within SOE.

MI(R)

Unlike Section D who mainly established facilities associated with research and development, MI(R)'s limited property portfolio was aimed towards training agents. By May 1940, MI(R) had already established a Special Training Centre (STC) at Lochailort, Scotland, to provide Polish wireless operators instruction in their new transceivers (*Figure 6*).[85]

Figure 6: Lochailort, home to MI(R)'s Special Training Centre. Here Polish wireless operators were trained so they could establish W/T stations behind enemy lines in occupied Europe.

MI(R) also established a training facility at Arisaig House, Inverness-shire, which was commanded by Major Munn (*Figure 7*). It was the function of this site to

[84] TNA HS 7/51 Chapter I: Origin and Early History of the Training Section p. 1
[85] TNA HS 7/183 Administrative Origins and Early Work of Polish Section p. 13

train students in demolitions, weapon training, combined operations, forward reconnaissance and clandestine intelligence work. Following an inspection of the local area by Major Davis and Major Wilson, Inverie House, Rhubana Lodge and Meoble Lodge were all requisitioned to serve as satellites to Arisaig House.[86] The clustering of MI(R)'s training facilities in the highlands of Scotland was to have an important impact on the later development of SOE's paramilitary schools.

Figure 7: Arisaig House, home to a MI(R) training facility. The facility was expanded with the requisitioning of Inverie House, Rhubana Lodge and Meoble Lodge to serve as wings to Arisaig House.

Department EH

Department EH inherited its name from Electra House, London, in which they were accommodated from 3 April 1939 (*Figure 8*). Within Room 207, a Reuter's tape machine, wireless equipment, maps and other relevant resources were

[86] TNA HS 7/51 Chapter I: Origin and Early History of the Training Section p. 3

all provided. Department EH was also provided with the services of a stenographer.[87] At the time of the organisation's mobilisation at 10:00 on 1 September 1939, Stuart, his personal staff, the chief printing officer and the Military Wing were all based at Electra House. Whilst Stuart's deputy along with the Planning, Editorial and Intelligence sections were all based at Woburn Abbey Riding School.[88]

Figure 8: Electra House, home of Department EH, and from which the organisation inherited their name.

Department EH's connection with Woburn Abbey, Bedfordshire, was serendipitous. Prior to the outbreak of hostilities, concerns over the threat posed to

[87] Eric Howe, *The Black Game* p. 38
[88] David Garnett, *The Secret History of PWE* p. 11

London by the Luftwaffe were rife within Whitehall. Government departments, therefore, began searching for potential safe refuges in the countryside far from the dangers of bombing. Department EH identified Woburn Abbey as suitable for their needs and immediately initiated negotiations with the Duke of Bedford's representatives.[89] Although unwilling to lease the Abbey, the Duke eventually compromised and allowed the organisation access to the Riding School and the stable block.[90]

In preparation for their staff relocating to Woburn Abbey, Department EH began alterations to the Riding School in August (*Figure 9*). Cubicles were created by inserting partitions whilst sleeping accommodation was arranged on the second floor of the stable block.[91] Initially, however, the organisation had to share the grounds with various other governmental departments.[92] It was not until later in the war that the estate became Department EH's sole preserve.

Figure 9: The Riding School, the linear building at the back of the photograph, at Woburn Abbey. At the outbreak of the Second World War, Department EH relocated to this property.

[89] Department EH's negotiations to gain access to the property were led by Leo Russell, a relative of the Duke of Bedford.
[90] Eric Howe, *The Black Game* p. 39
[91] Ibid pp. 39, 40
[92] TNA HS 8/337 Letter from Hugh Dalton to Lord Reith 02/12/1940 p. 1

Within close proximity to Woburn Abbey, Department EH acquired the use of The Old Rectory, Eversholt, Paris House (*Figure 10*), Foxfield and Maryland.[93] These properties could be used to accommodate visitors and 'where discussions with them can be held. Certain senior members of the staff not only live there, but do a considerable part of their work there'.[94] On the formation of PWE in 1941, Department EH's property portfolio passed from SOE to the new executive.

Figure 10: Paris House, Woburn Abbey, one of the main buildings acquired by Department EH on the Duke of Bedford's estate which were utilised as offices and accommodation.

SOE's Property Portfolio: An Overview

Before the formation of SOE in July 1940, her predecessors had begun establishing their own property portfolios. Although limited in extent, these sites were to form the core of SOE's later expansion of facilities. This thesis has identified

[93] TNA HS 8/337 Letter from Hugh Dalton to Lord Reith 02/12/1940 p. 2. All of these properties were located on the Duke of Bedford's estate.
[94] Ibid p. 2

that over the course of the Second World War, SOE operated 176 facilities across the UK.[95] The nature of these sites varied from office blocks located within central London, through large private properties up to stately homes. In common to all sites requisitioned by SOE was the organisation's requirement for land. This provided the organisation with space to train their agents, test their equipment and stockpile supplies.

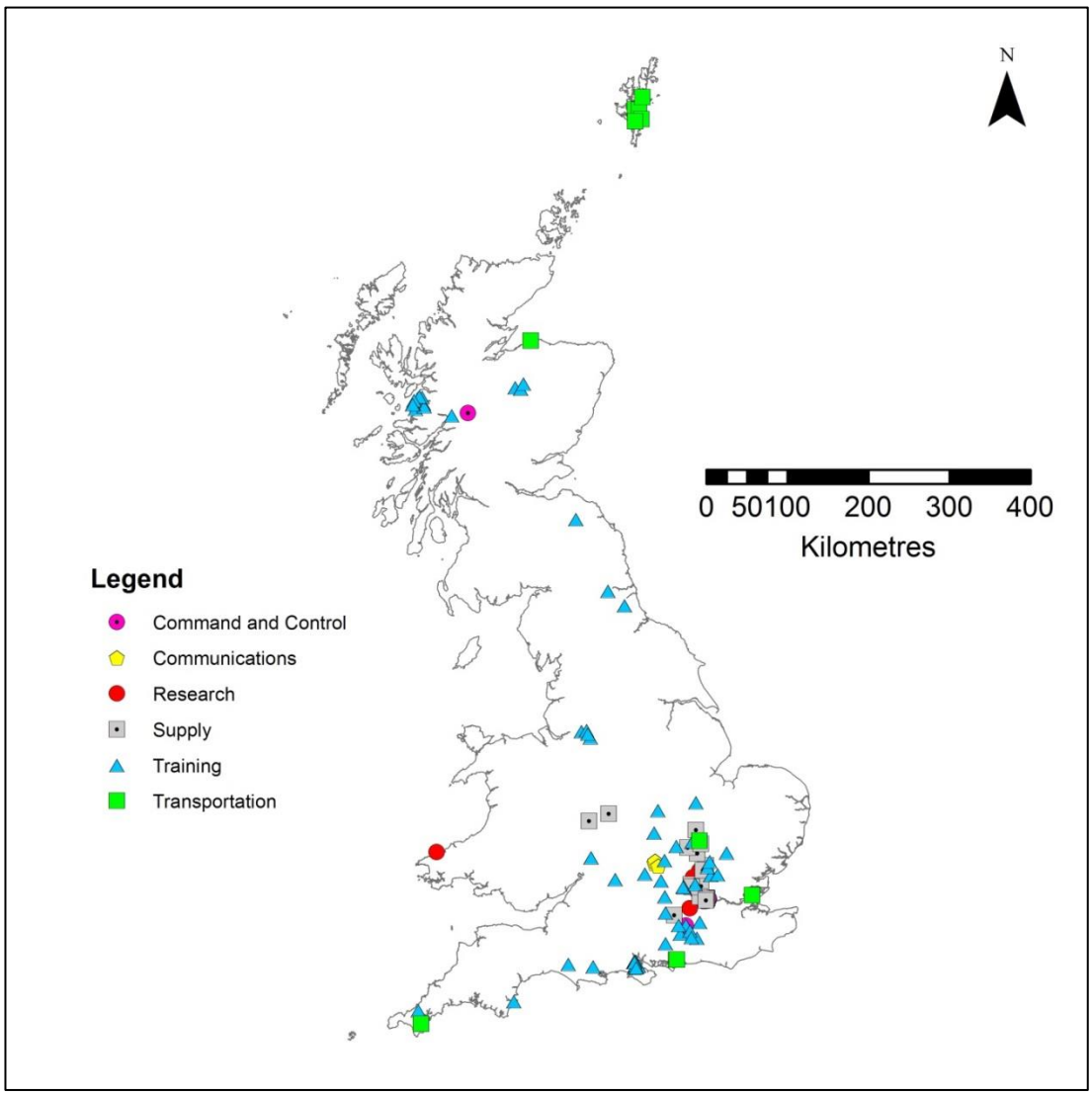

Figure 11: A composite map of SOE's property portfolio during the Second World War. For the first time, this thesis has mapped all known facilities operated by SOE in the UK during the Second World War.

[95] For a full list of all SOE's properties see Appendix A: Gazetteer.

By undertaking this study, a composite map of SOE's entire property portfolio within the UK has been produced for the first time (*Figure 11*). The greatest concentration of SOE's sites were found within reach of the organisation's command and control facilities located within central London. Facilities found on the periphery were generally associated with specialised activities, training or operational necessity. The transportation hubs located within Cornwall and the Shetlands were ideally situated for their area of operation in Brittany and Norway respectively. The clustering of training facilities in the Scottish Highlands had historical connotations for SOE. This was where MI(R) had previously established their bases for instruction in clandestine warfare. The following chapters will assess the nature and development of this portfolio with reference to the various aspects of SOE's operation.

CHAPTER III
Training

Central to the survival and potential operational success of SOE's agents working in occupied Europe was their training. Prior to the establishment of the organisation, comprehensive instruction in subversive warfare had never been attempted by the British Government. By the time SOE was disbanded in 1946, the organisation had devised a flexible training regime, indispensable to those operating abroad.[1] Despite the fundamental importance of training to the successful outcome of an operation, no published account exists on the activities of the Special Training Schools (STSs), SOE's primary vehicle for instructing prospective agents.[2] William Mackenzie, SOE's official historian, puts this failure to the fact that there was 'no centralised responsibility for the whole of SOE training … [therefore] it is not easy to give a comprehensive picture of its methods and output'.[3]

SOE's prospective students came from all walks of life: professional soldiers might respond to adverts on regimental notice boards, bored housewives could be approached by the 'man from the Ministry' or linguists responding to newspaper advertisements. On determining a candidate's potential suitability and the completion of a background check, SOE would request their presence at an interview conducted in London by the relevant Country Section's Recruiting Officer. This provided the recruiter an opportunity to assess the candidate's character and their potential as an agent.[4] On successfully being enrolled into SOE, a student was subjected to continuous assessment as they navigated the organisations training hierarchy. SOE's STSs were designed to act as a 'set of sieves' which only allowed

[1] William Mackenzie, *The Secret History of SOE: Special Operations Executive 1940-1945* (London, 2000) p. 735
[2] Cyril Cunningham, *Beaulieu: The Finishing School for Secret Agents 1941-1945* (London, 2005) p. 4. Published accounts have been produced for certain schools, see Patrick Yarnold, *Wanborough Manor: School for Secret Agents* (Guildford, 2009) certain aspects of the training, see Cyril Cunningham, *Beaulieu* and Stuart Allan, *Commando Country* (Edinburgh, 2010) or as a background to operations, see Michael Foot, *SOE: The Special Operations Executive 1940-46* (London, 1993) and Nigel West, *Secret War: The Story of SOE Britain's Wartime Sabotage Organisation* (London, 1992).
[3] William Mackenzie, *The Secret History of SOE* p. 734
[4] Juliette Pattinson, *Behind Enemy Lines: Gender, Passing and the Special Operations Executive in the Second World War* (Manchester, 2011) pp. 26, 27

the most competent students to progress towards becoming operational agents.[5] These stages included Preliminary, Paramilitary, Finishing and Specialist schools.

The provision of training was essential to the survival of SOE's agents in hostile territory. Failure to provide the necessary skills essential to 'pass' in occupied Europe could lead to mission failure, security implications and loss of life.[6] To ensure students were provided with up-to-date intelligence, information gathered from debriefing returning agents would be fed into the training programme. The smallest piece of intelligence overlooked by the instructors could undermine the security of an agent. Operatives in France, for example, could have compromised their cover if they attempted to order a 'café noir'; as milk was rationed, coffee was always served black.[7] Returning agents were, therefore, often reassigned to act as instructors.[8] This ensured that the training offered was reactive to the current milieu in occupied Europe.

Over SOE's lifetime, the organisation ran an estimated 13,500 'courses' for 6,800 students of various nationalities. SOE also provided SIS agents and SAS troopers with instruction in subversive warfare. At its peak, between 1,200 and 1,400 officers, NCOs and other ranks were employed by the Training Section.[9] As the war progressed, the number of STSs increased (*Figure 12*). This was related to SOE's increasing political support and the need to train a greater number of agents in preparation for Operation OVERLORD. Of SOE's 176 facilities, approximately 38% were dedicated to training. This clearly demonstrates an appreciation of the value of instructing agents in clandestine techniques to the success of the organisation.

[5] Michael Foot, *SOE* p. 79
[6] 'Passing' refers to the ability of an agent to act naturally within occupied territories so as not to draw attention to themselves. Agents had to immerse themselves in the culture of the country they were operating in. In order to operate freely, they had to conceal their identity as British agents.
[7] Elizabeth Vigurs, 'The Women Agents of the Special Operations Executive F Section – Wartime Realities and Post War Representations' (Unpublished PhD Thesis, The University of Leeds) p. 59
[8] TNA HS 9/986/2 Training p. 1
[9] William Mackenzie, *The Secret History of SOE* p. 734

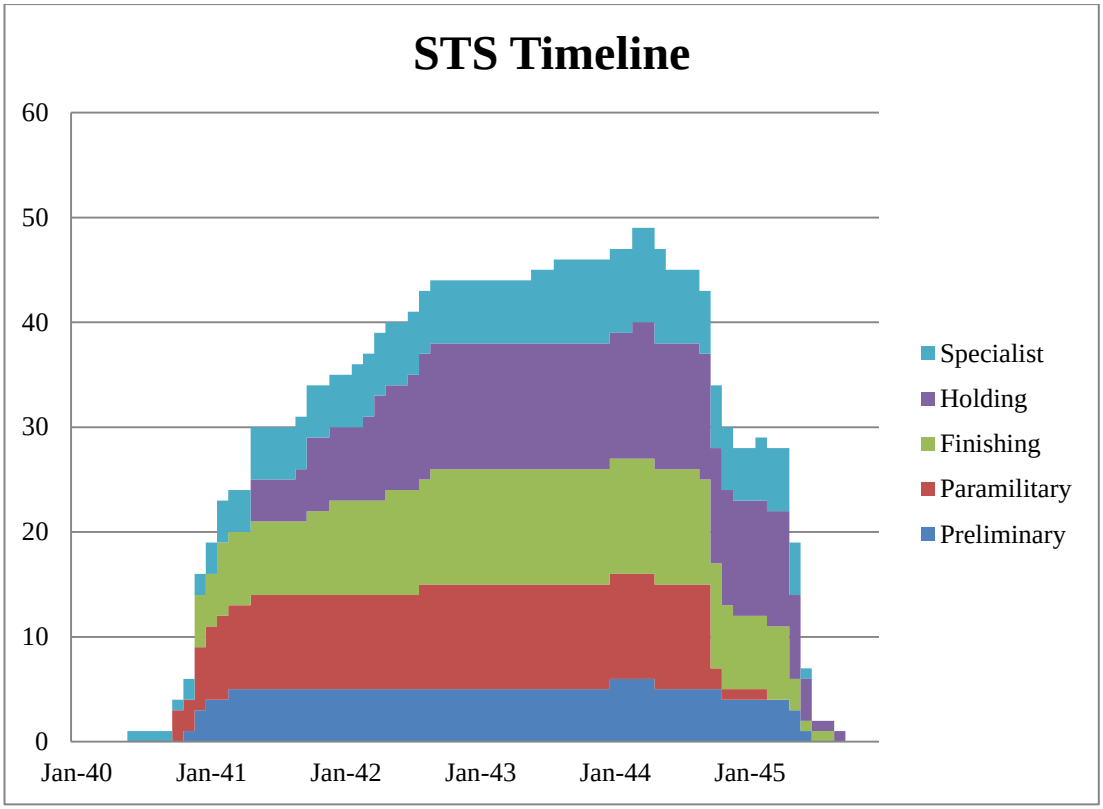

Figure 12: As the war progressed, the number of STSs increased. This was in relation to the greater political support offered to SOE from the end of 1941. Following the success of Operation OVERLORD, the number of training facilities operated by SOE rapidly decreased.[10]

The focal point of SOE's STS distribution was Greater London (*Figure 13*). This inevitably supported the top-down approach to agent selection. It also ensured constant and close supervision of student training by the organisation's support staff.[11] The Home Counties, however, were not suitable for every aspect of the training regime. Paramilitary instruction was offered in the wild and rugged Scottish Highlands whilst parachute training was provided at the RAF's parachute school in Manchester.

Training was not, however, restricted to SOE's field agents. On 5 November 1941 a memo informed the heads of all sections that '[i]t has been agreed by C.D. and the Daily Council that all newly joined officers of S.O.E., and other officers who have not yet taken a comprehensive training course, should do so in the future'.[12]

[10] Only those STSs with known opening and closing dates were incorporated into this graph.
[11] Patrick Yarnold, *Wanborough Manor* p. 20
[12] TNA HS 8/334 DA/OR/2444 05/11/41

The first programme of instruction was to start on 30 November and run until 7 December.[13] This intensive seven day course was designed to cover nearly all aspects of life as an agent operating within an enemy occupied country.[14] By providing their backroom staff with an appreciation of life in the field, SOE hoped that their UK based organisation structure could provide appropriate support.

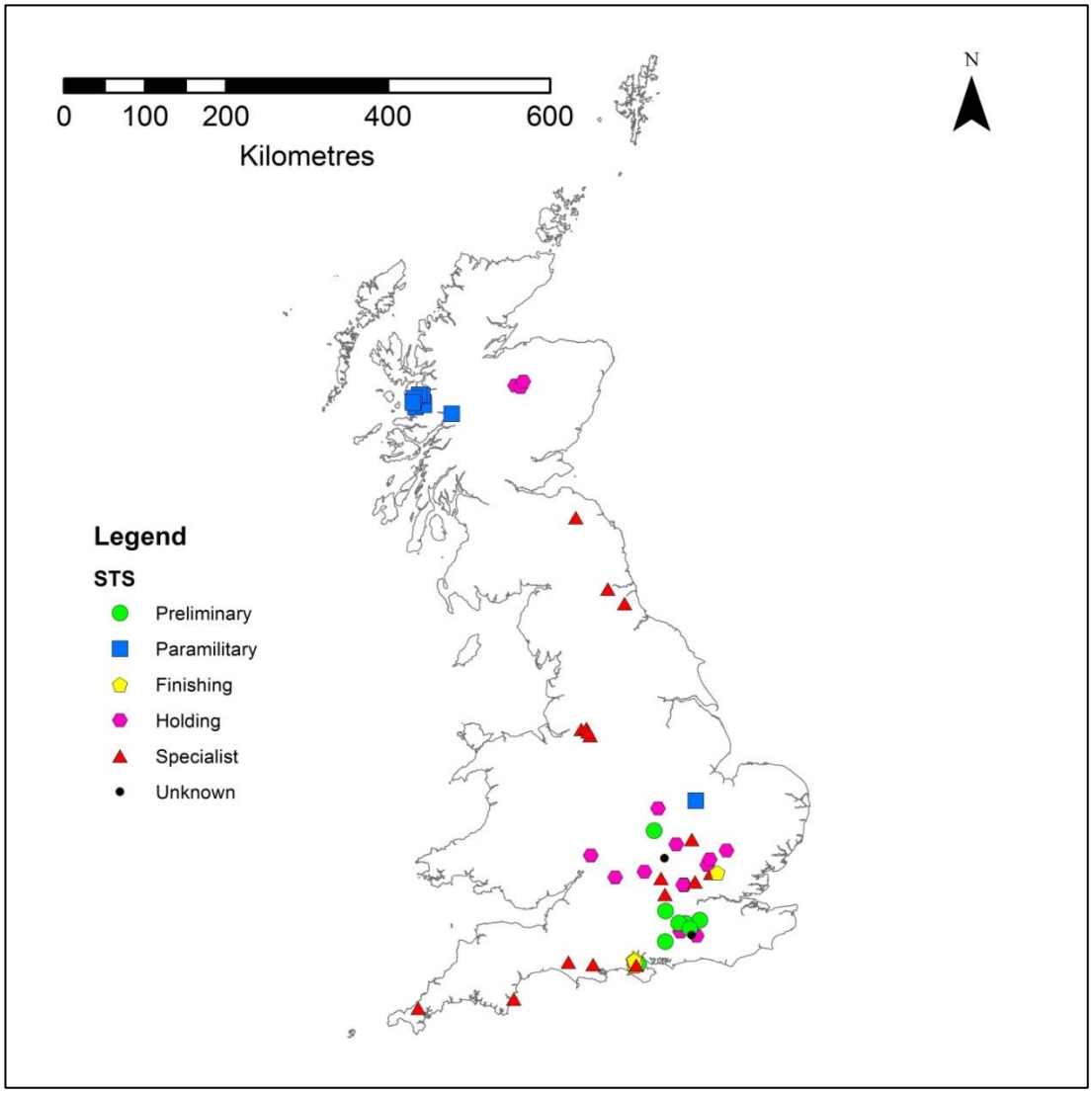

Figure 13: A composite map of the distribution of SOE's STSs. Throughout the war, the functions of STSs occasionally changed.

This chapter will demonstrate that over the course of the war, SOE developed an exceptional training package. The organisation provided their students with state-of-the-art equipment and a regime characterised by its flexibility, professionalism,

[13] This was two years before the official hsitory states staff courses begun.
[14] TNA HS 8/334 DA/OR/2444 05/11/41 Programme for officers of SOE pp. 1-2

continuity and its appreciation of up-to-date intelligence. This training equipment was of an ephemeral nature and is unlikely to survive.[15] To accommodate students and provide lecture facilities, it was essential that SOE requisitioned large houses with extensive estates. It was these pre-existing structures which have endured. Initially, this chapter will present an historical narrative of SOE's training regime. This is followed by a section on the physical nature of the equipment utilised by the instructors in preparing students for life in occupied Europe.

SOE's Training Regime: an Historical Context

On the formation of SOE in July 1940, it was abundantly clear that if they were to achieve the objectives Churchill had set, the organisation must have at its disposal a continuous stream of professionally trained agents. As the organisation's predecessors had demonstrated limited interest in providing their agents training, SOE was effectively starting from a blank canvas.[16]

On joining SOE in the autumn of 1940 from MI(R), Major Davies was immediately allocated the vital task of devising a training regime for prospective agents. Completing his paper by 12 October 1940, Davies' ideas were immediately adopted by the organisation. Although undergoing minor reactive alterations, his broad training principles remained relatively unchanged throughout the course of the war. Davies' envisaged a four tier system comprising of Preliminary, Paramilitary, Finishing Schools and Holding Schools. Each Country Section would also have a flat in London which it would use for the final briefing and dispatch of agents.[17] The following subsections examine the history, function and nature of SOE's hierarchical training regime.

[15] See p. 85 for a description of the nature of the remains which might survive.
[16] William Mackenzie, *The Secret History of SOE* p. 729
[17] Ibid pp. 729-30

Preliminary Schools (Group C)

Following selection, the first stage of a student's training was undertaken at the Preliminary Schools. Here, instructors focused on basic physical fitness, map reading and elementary firearm handling.[18] The syllabus also instructed in basic demolition, elementary wireless communication, fieldcraft and close combat.[19] As the vast majority of SOE's students lacked any previous military experience, this stage of their training was essential to future deployment.[20]

By 1941, the syllabus taught at Preliminary Schools lasted one month and was designed 'to test out the student['s] … "guts" … [and to] weed out those who are in any way unsound'.[21] One unorthodox technique employed to test their character was to assess the student's alcohol tolerance.[22] Following attendance of a lecture on the security implications of excessive drinking, instructors would then take the students to a local bar. At these establishments, Security Officers would ply the recruits with free alcohol to test their willpower and observe their inebriated state.[23] The attention paid to the less obvious aspects of a student's character reflects the professionalism of SOE's instructors. This attitude ensured only the most able graduated to work as agents in the field.

Within months of SOE establishing their new training regime, the standard of instruction at the Preliminary Schools was already being commended. By 19 April 1941, the Paramilitary Schools Commandant was of the opinion that 'No.1 Special School [Brock Hall] deserve great credit for the manner in which the students had been prepared for their Paramilitary. They were found to be about one week in advance of most parties arriving here. They are about the best lot I have yet encountered, always cheerful and on the whole very keen. In fieldcraft and guerrilla warfare they are excellent'.[24] Despite this internal praise originating from within the Training Section, Preliminary Schools were often the focus of organisational criticism. The provision of training whilst maintaining total operational secrecy

[18] Michael Foot, *SOE* p. 80 and Roderick Bailey, *Forgotten Voices of the Secret War: An inside history of Special Operations during the Second World War* (London, 2008) p. 45
[19] TNA HS 6/961 MZ/OR/1004 Appendix F p. 1-2
[20] Patrick Yarnold, *Wanborough Manor* p. 21
[21] TNA HS 6/961 MZ/OR/1004 Appendix F p. 1
[22] Marcel Ruby, *F Section SOE: The Story of the Buckmaster Network* (London, 1990) p. 80
[23] Juliette Pattinson, *Behind Enemy Lines* pp. 52-3
[24] TNA HS 6/961 19/04/1941 Course 23D

proved difficult. Country Sections were also concerned of the four week delay imposed by this initial stage in training.[25]

Unable to appreciate the importance of continual student assessment, Country Sections demonstrated total faith in their Recruiting Officer's decision. In the case of SOE's French F Section, Captain Selwyn Jepson was solely responsible for recruiting students.[26] As a student progressed through the organisation's training programme, the greater the security risk they posed if they were eventually deemed unsuitable.[27] During their time with SOE, failed students would have gained knowledge of their peers, instructors, techniques and potential targets. Identifying individuals early who were unlikely to graduate as agents was, therefore, vital to the organisation. The inclusion of Preliminary Schools as a form of student assessment was essential to the security of SOE. Up until the summer of 1943, this remained the main point of entry. Eventually, they were replaced by the Student Assessment Board (SAB) which was a compromise between the Country Sections and the security of the organisation.

Student Assessment Board

It was inevitable that not all candidates sent to the Preliminary Schools by the Recruiting Officers were the right calibre. Instructors often found it difficult to convince the Country Sections that they had made a mistake. In an attempt to address the security concerns associated with failed students, SOE established the 'ISRB Workshop', Inverlair, known as 'The Cooler' (*Figure 14*). At this facility, individuals who had failed to complete their training were detained until they no longer proved a risk.[28] By 1943, the student dropout rate was too great to continue with the current system. It was, therefore, decided to replace the Preliminary Schools with the SAB.[29]

[25] William Mackenzie, *The Secret History of SOE* p. 730
[26] Roderick Bailey, *Forgotten Voices of the Secret War* p. 35
[27] Michael Foot, *SOE* pp. 59, 79
[28] William Mackenzie, *The Secret History of SOE* p. 730
[29] TNA HS 7/51 History of the Training Section of SOE 1940-1945 p. 18

Figure 14: Inverlair Lodge, the 'Cooler'. It was here that failed students were accommodated until they were no longer deemed a security risk.

At the time of this decision, the Country Sections concerns with the time students spent in preliminary instruction was now shared by the newly appointed Director of Training, Lieutenant Colonel Woolrych. The solution was the introduction of a bastardised War Office Selection Board for Officers.[30] Initial student assessment would now be based on a combination of physical and psychological tests as well as interviews which span four days.[31] Potential candidates would still, however, be selected by the Country Section's Recruiting Officer.[32]

Replacing Preliminary Schools with a selection board inevitably resulted in the desired reduction in the initial stage of training. To pacify those concerned with a decline in the length of time students underwent instruction, the syllabus at the Paramilitary Schools was extended. Overall, however, the training syllabus was successfully reduced. This had the duel benefit of enabling greater numbers of

[30] TNA HS 7/51 History of the Training Section of SOE p. 18
[31] William Mackenzie, *The Secret History of SOE* p. 730
[32] TNA HS 7/51 History of the Training Section of SOE p. 18

students to pass through SOE's STSs whilst, concurrently, releasing properties previously utilised as Preliminary Schools for more pressing training requirements.[33]

By March 1943, Gubbins was presented with the finalised plan for the new selection board. The following month, the necessary arrangements had been made for the replacement of the Preliminary Schools in favour of the SAB. Lieutenant Colonel Charley, from SOE's Security Section, was appointed the first president of the board. To accommodate the SAB, Preliminary School STS4, Winterfold, was chosen and renamed STS7.[34] On 5 April 1943, all regional heads and Country Sections were informed that the Preliminary Schools were no longer accepting applicants.[35] The SAB finally welcomed its first party of prospective students in June.[36]

The first stage of the SAB involved every candidate being interviewed by either the board's president or deputy-president. This provided a base line from which the prospective students could be assessed. Candidates would then be subjected to a series of psychiatric interviews and psychological and physical tests. By comparing these with the personal records of those students who went on to become field agents meant the SAB's tests could be tailored to individuals.[37] These records were also of value 'when an agent, as a result of his experience was in need of psychiatric treatment, which was carried out as far as possible by the psychiatrists of the SAB'.[38]

By the autumn of 1944, when the end of the war was in sight, SOE dramatically reduced the scope of their training programme. On 16 November the SAB was finally closed. SOE did, however, retain the services of one psychiatrist and a sergeant to administer remedial treatment to returning agents.[39]

SOE's introduction of the SAB resulted in a 'marked decrease in the numbers of men rejected from training, and most Country Sections expressed themselves well satisfied with the system. This satisfaction was not however, unanimous, and it was held by some that the SAB constituted a bottleneck, which was holding up

[33] TNA HS 7/51 History of the Training Section of SOE p. 18
[34] Ibid pp. 18-9
[35] TNA HS 8/792 MCD/884 08/04/1943
[36] TNA HS 7/51 History of the Training Section of SOE pp. 18-9
[37] Ibid pp. 20-1
[38] Ibid p. 21
[39] Ibid pp. 21-2

operations, and a number of applications were made for candidates to be excused passing through the SAB'.[40]

Paramilitary Schools (Group A)

Students who successfully graduated from the preliminary stage of training relocated to Scotland for an intensive three to four week course in paramilitary instruction (*Figure 15*).[41] Security and the hostile environment made the Scottish Highlands the ideal setting for this stage of the students training. The Defence Regulation of 1939 empowered by the Emergency Powers (Defence) Act designated the whole of north-west Scotland, above the Great Glen, as a 'Protected Area'. Although intended to enhance the security of the strategically sensitive coastline and naval base at Scapa Flow, it had the added benefit of providing a secure locality for clandestine training.[42] Following a failed operation to Sognefjord in 1940, Lieutenant Colonel Bryan Mayfield and Captain William 'Bill' Stirling, of SAS notoriety, in collaboration with MI(R) established an irregular warfare school at Inverlochy Castle. Topographically and climatically, the hostile environment was ideal for instructing students in fieldcraft and survival skills (*Figure 16*).[43]

SOE's predecessor's connection with the Scottish Highlands gave the organisation a foothold in the area. To accommodate the number of students SOE sent for paramilitary training, it was inevitable that the number of STSs in the region would have to proliferate. At these schools, candidates were physically prepared for operating within an hostile environment. Students were instructed in fieldcraft, map reading and 'living off the land'.[44] By 1941, the syllabus also included weapons training, demolitions, grenade throwing, wireless telegraphy (W/T) and close combat.[45]

[40] TNA HS 7/51 History of the Training Section of SOE p. 20
[41] Michael Foot, *SOE* p. 80
[42] Stuart Allan, *Commando Country* p. 35 and Stuart Allan, 'Individualism, exceptionalism and counter culture in Second World War special service training', *Waterloo to Desert Storm: new thinking on international conflict*, 1815-1991 (2010) pp. 2, 6
[43] Stuart Allan, 'Individualism … ', p. 6 and Stuart Allan, *Commando Country* p. 37
[44] Juliette Pattinson, *Behind Enemy Lines* p. 64
[45] TNA HS 6/961 MZ/OR/1004 Appendix F p. 3

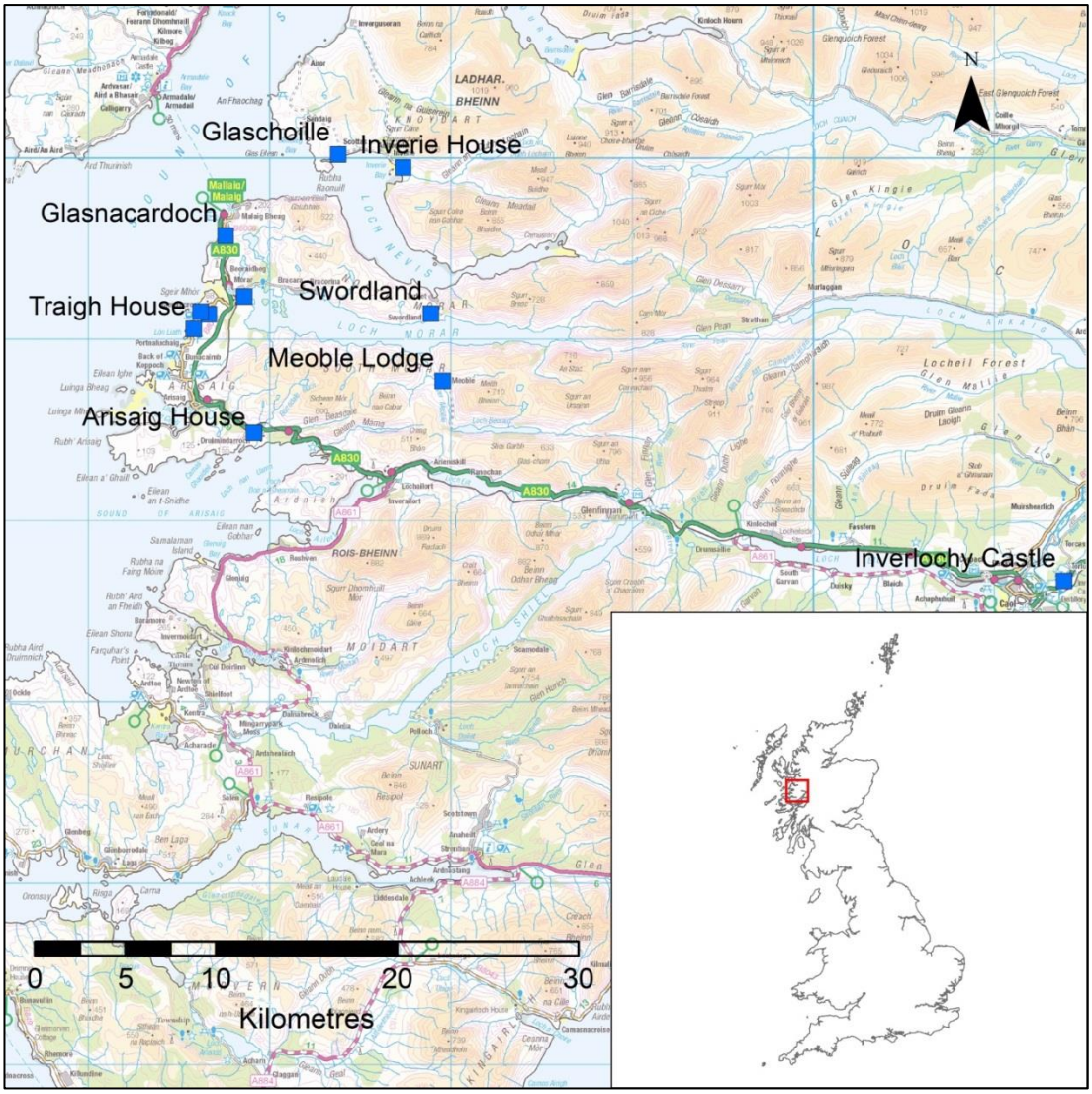

Figure 15: Distribution of SOE's Paramilitary Schools in the Scottish Highlands. These facilities were all clustered around Loch Morar with the exception of Inverlochy Castle. This facility was inherited by SOE on its formation.

The paramilitary instructors ensured that the students attending the schools were pushed both mentally and physically. Before breakfast, a series of physical exercises had to be successfully completed. The remainder of the day involved attended lectures, undertaking courses and practical fieldcraft instruction. To provide students with practical experience of self-sufficiency, the instructors would also leave the students in the wilderness with dummy explosives and a target to attack. Over the following days, the candidates had to survive by poaching and foraging.[46]

[46] Roderick Bailey, *Forgotten Voices of the Secret War* pp. 49-50

The development of extended exercises allowed students to transfer theoretical skills learnt in the lecture hall into practical experience.

Figure 16: The landscape of Scottish Highlands is bleak and unforgiving. It was within this environment that SOE sent their students to learn how to live off the land. These exercises could last several days and were designed to test various skills learnt during their training.[47]

Whilst attending the Group A Schools, courses were also provided in paranaval activities. Instruction was given in simple navigation, elementary sailing, boat maintenance, use of underwater containers, beach reconnaissance and visual signalling.[48] To aid the instructors, SOE supplied a number of small vessels.[49] On 23 February 1941, it was proposed to increase the size of this fleet by the purchase of a West Coast fishing drifter which would be used for landing exercises.[50] Despite SOE providing the necessary resources, the paranaval instruction was the source of

[47] Author 2014
[48] TNA HS 8/792 HHH/683 05/04/1942
[49] TNA HS 8/792 MZ/2019 24/04/1941
[50] TNA HS 8/792 23/02/1941 Proposals for Development of Paramilitary Training p. 1

criticism. Techniques taught were occasionally reproached for being 'impracticable'.[51] This was because the infancy of paranaval operations meant instructors often had to learn techniques in parallel to providing training.

To train students in the art of paramilitary activities, SOE recruited instructors with diverse backgrounds. It was felt that the innovative nature of clandestine warfare required new thinking untainted by the traditional military establishment. Although some instructors had previously served as soldiers, the organisation also employed those who had practical life experience.[52] One of these was the Sandringham estate's gamekeeper who taught fieldcraft. When employing instructors, SOE identified those candidates with exception skills. Although SOE's Major Sykes, previously of the Shanghai Municipal Police Reserve Unit, personified a stereotypical 'country rector', he was deadly in unarmed combat.[53] It was the organisation's desire to employ the best instructors for their students despite their backgrounds: an unorthodox method of warfare required unconventional thinkers.

Finishing Schools (Group B)

Following the successful completion of paramilitary training, students were sent to Beaulieu, Hampshire, for a six week 'finishing' course.[54] It was here that prospective agents were taught how to 'pass' everyday scrutiny when living in enemy territory. Failure to act like a native would draw unwanted attention to an agent's activities.[55] At these schools, students were instructed in how to be an 'agent' instead of just a 'saboteur'.

[51] TNA HS 8/792 From D/NAVY to M 16/06/1942
[52] Stuart Allan, *Commando Country* p. 174
[53] Roderick Bailey, *Forgotten Voices of the Secret War* p. 49, 58
[54] Juliette Pattinson, *Behind Enemy Lines* p. 69
[55] Nigel West, *Secret War* p. 85

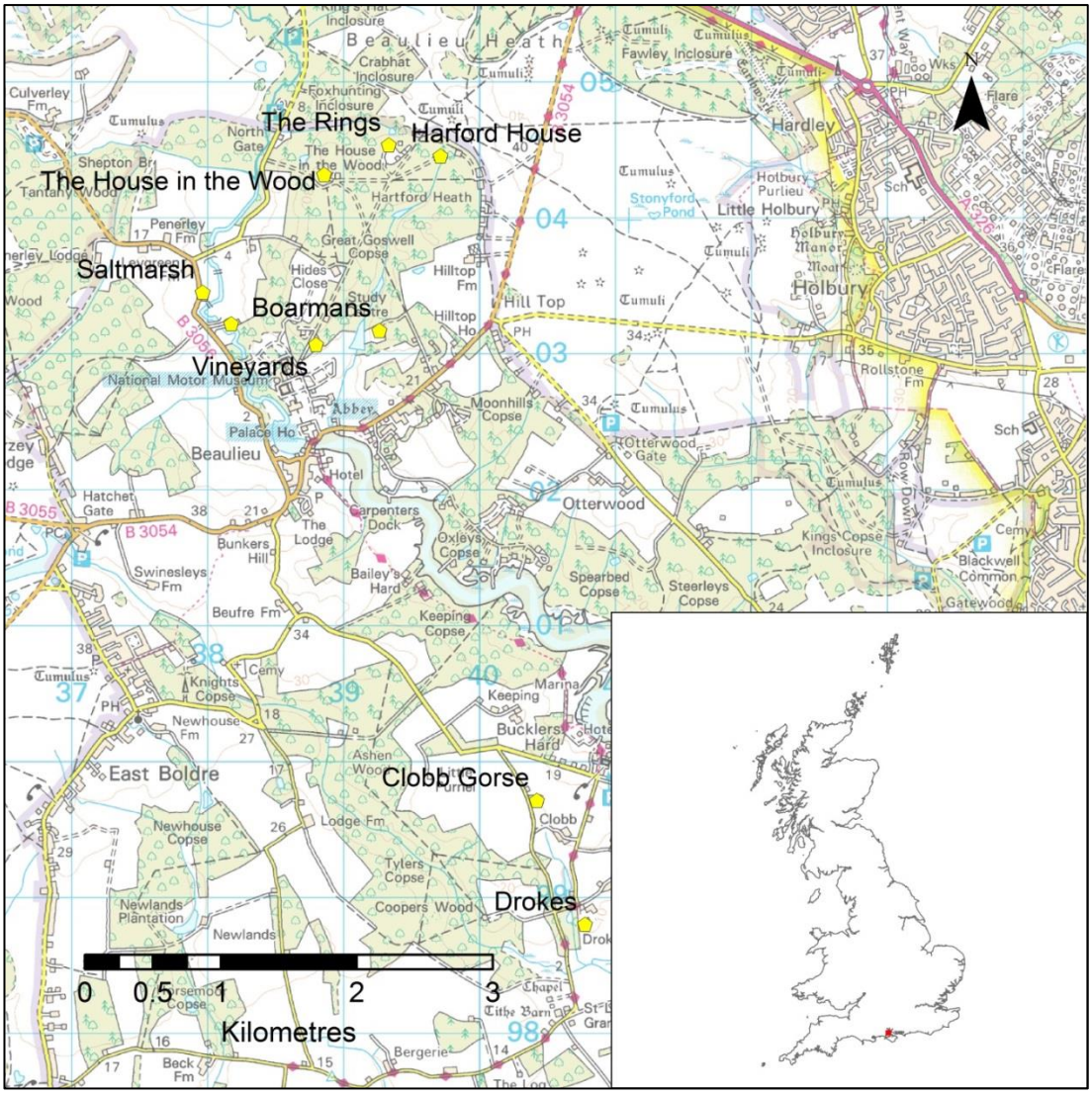

Figure 17: Distribution of SOE's Finishing Schools in the Beaulieu area. This location offered SOE numerous large properties within close proximity. These facilities could provide accommodation, office space and large estates necessary for the training of students.

By the autumn of 1940, it was decided to locate the Finishing Schools in an area where numerous suitable properties were conveniently located around a central headquarters (*Figure 17*). This arrangement would enable students to be segregated by nationality whilst pooling specialist instructors.[56] By centralising their instructors, SOE could offer a high standard of consistent training. The property chosen to accommodate the tutors was Beaulieu Manor (*Figure 18*).[57] Within close proximity there were a variety of suitable properties which could also be requisitioned. These

[56] Cyril Cunningham, *Beaulieu* p. 18
[57] Michael Foot, *SOE* p. 85

offered a wide range of accommodation from small properties which only billeted four students through to much larger facilities which housed specialised instruction.[58]

Figure 18: Beaulieu Manor, Hampshire. This provided accommodation for the instructors at SOE's Finishing Schools.[59]

On first arriving at the Finishing Schools, students were lectured on the facilities security regulations. This included a strict ban on leaving the boundaries of the STSs.[60] Despite this warning, students regularly wandered off. It was the responsibility of SOE's Security Officers to monitor conversations in local pubs and to return those students found outside the confines of the schools.[61] The confining of students in a small location would inevitably result in some form of fraternisation between parties. Security implications associated with this were clearly outweighed by the advantages of centralising highly specialised instructors.

[58] TNA HS 8/960 SOE Special Schools at Beaulieu, Hampshire Oct 1942 p. 1
[59] Author 2013
[60] TNA HS 7/52 Security Talk
[61] Cyril Cunningham, *Beaulieu* p. 5

Whilst attending the Finishing Schools, the students' syllabus included robbery, burglary, forgery, 'black' propaganda, blackmail, cyphers, pigeon handling, invisible inks and the German counter-espionage agencies.[62] To provide students with applied, as well as theoretical instruction, three categories of practical exercises were devised.[63] These were indoor, outdoor and 96 hour schemes. Indoor, 'Y', exercises enabled students to practice topics covered in lectures which might include concealment, body searches and personal disguises. In contrast, outdoor 'X' schemes gave prospective agents a taster of clandestine life.[64]

By introducing a 96 hour scheme, SOE's instructors devised an exercise which tested a student's ability to survive in enemy territory over an extended timeframe. 'Agents' would be dispatched to a large conurbation with the objective of reconnoitring a specified target.[65] In order to achieve this, contact had to be made with a known 'sympathiser' who was 'favourable to the cause. The student [then] has to ... give him a definite job in the organisation, and train him not only for this job but also in general security precautions. In addition he has to arrange clandestine communications with the contact'.[66] To ensure a heightened level of realism, the 'agents' would be under police surveillance. Those who successfully lost their tail would eventually be 'arrested' and subjected to interrogation.[67] 2nd Lieutenant T Brooks recalled that:

> 'About two o'clock in the morning we were woken up by batmen and mess waiters we recognised but dressed as German troops with tin hats on and rifles with bayonets. We were thrown out of bed, told to wrap ourselves up in our blankets and marched out barefoot across the parade ground into the garage where *Sturmführer* Follis was wearing his SS uniform. We were told to stand up and were harangued in broken Kruat, which became English, and taken through our training cover stories and I played it straight … This was a very valuable experience'.[68]

[62] Cyril Cunningham, *Beaulieu p*p. 43, 63, 109 and TNA HS 7/52 Introduction to Course A.1 pp. 1-2
[63] TNA HS 7/52 Introduction to Course A.1 p. 1
[64] TNA HS 7/52 Exercises p. 1
[65] Ibid pp. 1-2
[66] Ibid p. 2
[67] Ibid p. 2
[68] Roderick Bailey, *Forgotten Voices of the Secret War* p. 60

To instruct the students in the way of 'passing', SOE employed a group of 'pretty odd fish'.[69] These included John Wedgwood, of the pottery family,[70] Bill Brooker, a European Nestlé salesman, Paul Dehn, a Sunday newspaper film critic, Kim Philby, who proved to be a communist spy, and Johnny Ramenski, an ex-convict SOE released from prison.[71]

Holding Schools (Group C)

The penultimate stage in a student's training before graduating as an agent took place at Holding Schools. As accommodating those awaiting deployment at Finishing Schools proved impractical, Holding Schools were established to fill this requirement.[72] These new facilities were dispersed throughout the Home Counties isolated from SOE's other STSs. This distribution illustrates a desire within the organisation to isolate agents awaiting operational clearance. By imposing physical segregation, SOE ensured there could be limited fraternisation between agents. This acted as a security precaution which ensured sensitive operational details could not be compromised by the capture of one of their operatives.

Initially intended to house agents segregated by nationality, this rapidly proved impractical. As the number of operatives belonging to each of the Country Sections fluctuated over time,[73] SOE could not feasibly allocated specific Holding Schools to individual nationalities.[74]

Despite this reluctance, the organisation did allocate accommodation for the Norwegian contingent at Fawley Court, Buckinghamshire. By November 1941, SOE determined that this facility was detrimental to the agents accommodated there. It was deemed that the environment of the Home Counties was impacting the pre-deployment conditioning of their operatives. In an effort to ensure the Norwegians were in peak operational condition, SOE relocated their Holding Schools to Aviemore, Scotland.[75] These facilities were, after all, intended as 'pools in which trained agents could be held in conditions of comparative security and in which

[69] Cyril Cunningham, *Beaulieu* p. 63
[70] Kim Philby, *My Silent War: The Autobiography of a Spy* (London, 2003) p. 30
[71] Cyril Cunningham, *Beaulieu* pp. 63, 65, 66, 70, 72
[72] William Mackenzie, *The Secret History of SOE* p. 731
[73] Ibid p. 731
[74] TNA HS 7/51 History of the Training Section of SOE Chapter X p. 49
[75] TNA HS 7/174 Norwegian Section History 1940-1945 p. 26

undue deterioration of their physical condition could be avoided'.[76] Despite this function, this stage in SOE's training regime was routinely criticised. Many felt it was difficult to effectively plan work programmes for agents under such conditions. Country Sections also demonstrated a preference for accommodating agents in London for briefings.[77]

Although originally coming under the direct control of the Training Section, by August 1942 it was decided that Holding Schools required closer supervision than currently available. Major Spooner, Commandant of STS45, was, subsequently, promoted to Lieutenant Colonel and appointed as Inspector of Schools. This coincided with the combing of Preliminary and Holding Schools into Group C facilities. Although Spooner was tasked with ensuring a high standard of instruction within this group of schools, his remit was extended to safeguard the proper coordination of training throughout a student's career.[78]

Despite the appointment of Spooner, Holding Schools were still criticised. In December 1942, it was brought to the attention of General Ingr that morale amongst the Czechoslovakian agents accommodated at STS46, Chichley Hall, was deteriorating.[79] Tasked with investigating these reports, Colonel Moravec determined that although morale was good, there was a lack of military discipline. The decline in morale which had been observed was the result of 'the fact that these men had been too long at STS46'.[80] Independently, SOE concluded that this deterioration was because of the failure of the Czechoslovakian headquarters to develop a firm operational programme. Instructors at Holding Schools were thus presented with agents who lacked specific operational roles and timeframes for deployment. In SOE's view, it was 'this complete lack of direction that the decline in morale must be attributed'.[81]

The lack of initiative in developing innovative training packages at Holding Schools was attributed to the Country Sections' negative attitude. By not acknowledging that the stagnation of agents in these facilities was the result of their indifference, Country Sections underestimated the potential value of these STSs. As the deterioration of agents could not be allowed to continue, the Training Section, in

[76] TNA HS 7/51 History of the Training Section of SOE Chapter X p. 50
[77] William Mackenzie, *The Secret History of SOE* p. 729
[78] TNA HS 7/51 History of the Training Section of SOE Chapter X p. 50
[79] TNA HS 4/1 MX/CZ/1393 p. 3
[80] Ibid p. 4
[81] Ibid p. 4

collaboration with the Country Sections, gradually began making improvements. Throughout 1942 and 1943, the elderly commandants of the Holding Schools were replaced by younger, more dynamic officers. It was hoped that these officers, who had experience of contemporary training techniques, might bring new and unorthodox ideas to the criticised STSs.[82]

The exception to this universal criticism of Holding Schools was STS45, Hatherop Castle. At this facility, 'a comprehensive and graduated programme of training was put into practice, due mainly to the energy and foresight of Major Spooner and to the co-operative attitude of the Danish Country Section'.[83] STS45's principle was that a student's training should revolve around the Holding School. From there they 'went to the specialised courses in other schools, but returned each time to consolidate the knowledge they had gained and to integrate it into their general plan of training which was based on their probable mission'.[84] It was this energy and dynamism that SOE hoped to install into the other Holding Schools by appointing Spooner Inspector of Schools. Despite efforts to improve the quality of Holding Schools, these facilities were replaced with Operational Holding Schools following the formation of the SAB in 1943.

Operational Holding Schools (Group C)

With the formation of the SAB, SOE combined the remnants of the Preliminary Schools with the Holding Schools to form 'Operational Holding Schools', also known as Group C.[85] Despite the abolishment of the often criticised Holding Schools, there was still 'little real co-operation … reached with the Country Sections who persisted in withdrawing their students at the shortest notice, making the preparation of a training programme extremely difficult, or even in keeping them entirely in London [out of the Operational Holding Schools]'.[86]

In keeping with the individualistic nature of agents' roles in occupied Europe, training at Group C Schools was 'derive[d] from the operational role of the student,

[82] TNA HS 7/51 History of the Training Section of SOE Chapter X pp. 50-1
[83] Ibid p. 50
[84] Ibid pp. 50-1
[85] Ibid p. 51
[86] Ibid p. 51

and the previous instruction he [or she] had received'.[87] Individualised training programmes were developed to address the weaknesses identified in the student's report card. Instructors also took into account the agent's mission and estimated timeframe until departure.[88] By providing tailored training at Operational Holding Schools, SOE tried to eradicate the belief within Country Sections that agents stagnated whilst awaiting deployment.

Before the introduction of the Operational Holding Schools, their predecessors have attempted to establish 'extended' exercises for agents awaiting deployment. These were, however, not without their critics. Moravec felt these schemes 'encouraged the [Czechoslovakians] students to sit about in pubs and did little to improve either their conspirative skill or their morale'.[89] By January 1943, however, Morvac was eventually persuaded that extended exercises had benefits.[90] The introduction of the Operational Holding Schools saw these exercises replaced with the 'Group C Continuation Schemes'. Based on the Finishing Schools' 96 hour exercises, the Continuation Scheme was designed to test group dynamics. Whilst participating, agents were expected to utilise the full range of skills they had learnt from their training. In parallel, those awaiting deployment were also continuously subjected to exercises which covered all aspects of clandestine living.[91] The realism of the exercises arranged by the Operational Holding School illustrates SOE's desire to ensure their agents were prepared for all eventualities.

With the end of the war in sight by the autumn of 1944, SOE disbanded their Paramilitary Schools. To ensure the organisation did not lose the function of these facilities, the Operational Holding Schools inherited their syllabus. With the nature of the war changing, SOE also realised there was no longer a need to supply the resistance with support staff. What they required were professionals to lead guerrilla activities. SOE, therefore, increased its recruitment of officers with experience of modern warfare. As the situation in Europe was changing on a daily basis, it was essential that the training became even more flexible. Students now had to be rushed through the training programme with some courses lasting only seven days. Following the liberation of France and Belgium, paramilitary training at Operational

[87] TNA HS 7/51 History of the Training Section of SOE Chapter X p. 52
[88] Ibid p. 52
[89] TNA HS 4/1 MX/CZ/1393 p. 4
[90] TNA HS 4/1 MX/CZ/1446 p. 1
[91] TNA HS 7/51 History of the Training Section of SOE Chapter X p. 52

Holding Schools was subsequently run on an *ad hoc* basis.[92] With the introduction of the SAB in 1943, SOE reconfigured its training programme. Preliminary Schools, which were now surplus to requirements, were combined with the Holding Schools to form 'Operational Holding Schools'. These facilities devised innovative and individualistic training courses tailored to students' requirements.

Specialist Schools

Before a student could be removed for active duty, they each had to complete a specialist course.[93] To prepare prospective agents for the specific roles identified for them by their instructors, SOE established numerous Specialist Schools. Some STSs were established primarily to teach industrial sabotage, radio operation, organising reception committees and microphotography (*Figure 19*).[94] Although not every agent despatched by SOE was allocated a specific operational target, they were all sent to fill certain roles. The provision of standard training ensured each student was fully prepared for life in hostile territory. Specialist instruction, however, allowed SOE to embed agents within the resistance who were experts in their allotted function.

Dispersed to the north of London, SOE's Specialist STSs were interspersed amongst the organisation's Holding Schools. This distribution was based on the principal developed at STS45, Hatherop Castle, whereby students would be accommodated at Holding Schools and then sent to specialist facilities for further instruction.[95] On returning to their Holding School, the student would then 'consolidate the knowledge they had gained and to integrate it into their general plan of training'.[96] Specialist STS's proximity to Holding Schools was, therefore, favourable.

[92] TNA HS 7/51 History of the Training Section of SOE Chapter X pp. 52-3
[93] TNA HS 8/792 MCD/884 08/04/1943
[94] William Mackenzie, *The Secret History of SOE* p. 732-3
[95] TNA HS 7/51 History of the Training Section of SOE Chapter X pp. 50-1
[96] Ibid pp. 50-1

Figure 19: Industrial sabotage and wireless operation were some of the specialist topics taught to students at SOE's STSs. Within the grounds of several of SOE's STSs, railway track was laid so that the students could practice demolition techniques.[97]

SOE's first specialist school was formed at Station XVII, Brickendonbury, in 1941.[98] Originally established by Section D, SOE converted this facility into one which purely taught industrial sabotage and renamed it STS17. At this time, 'no previous experience was available on which instruction could be based. It was necessary, therefore, to start from scratch and first develop suitable methods of sabotage and then to devise a suitable training programme'.[99] One of the greatest challenges faced by the new instructors was the limited engineering knowledge of their students.[100]

[97] Norwegian Resistance Museum 049113
[98] TNA HS 7/51 History of the Training Section of SOE Chapter I p. 2
[99] TNA HS 8/370 Report on the Development of Industrial Sabotage Training at STS17 p. 1
[100] Ibid p. 1

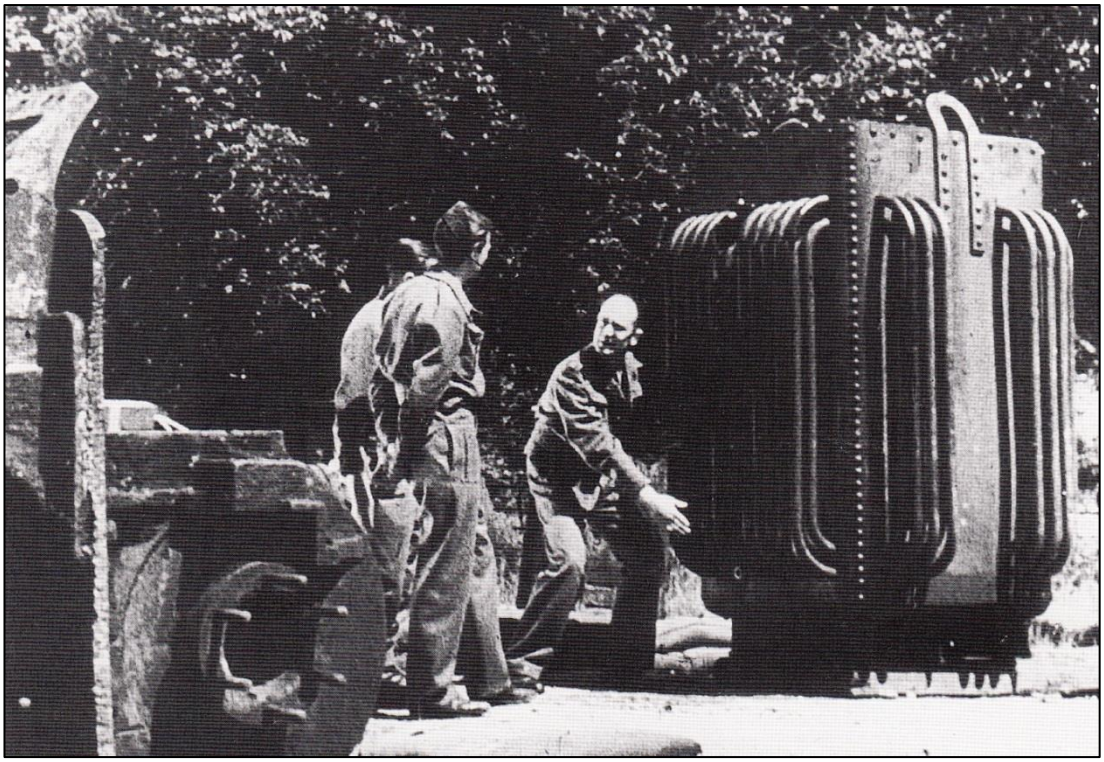

Figure 20: Students receiving training at STS17, Brickendonbury. To increase the realism of the instruction, SOE brought in machinery on which students could learn the practical skills of sabotage.[101]

By August 1944, STS17's instructors had devised three training packages which covered all students' abilities. The basic course was designed for personnel with no prior technical experience and lasted three weeks.[102] It was STS17's basic function to teach prospective agents the most effective way of disabling machinery (*Figure 20*).[103] For those students who were to focus on a specific branch of industrial sabotage, the instructors devised the specialist course which lasted one to seven days. In the case of agents who were being prepared for a specific mission, instructors would design operational courses which could last between two and seven days. Central to all these syllabuses were visits to engineering works, factories and installations of strategic importance. Seeing the equipment in situ was invaluable

[101] IWM MH24430
[102] TNA HS 8/370 Report on the Development of Industrial Sabotage Training at STS17 pp. 3, 6, 11-12
[103] Gordon Rottman, *World War II Allied Sabotage Devices and Booby Traps* (Oxford, 2010) p. 30

aid to teaching. Despite staffing shortages and the multilingual nature of the courses, instruction available at STS17 was regarded as 'surprisingly good'.[104]

One of the most important members of a resistance network was the wireless operator. It was only through direct contact with them that operations could be planned, coordinated and initiated by SOE. As one of the most dangerous positions available within the resistance, SOE had to be certain that those students they trained to be W/T operators were of the right calibre. Early on in the training programme, instructors identified those students who demonstrated a 'combination of intelligence, courage and discretion, plus the necessary degree of physical fitness' to attend the wireless schools.[105]

SOE were quick to appreciate that '[s]ecret signallers are as different from ordinary W/T operators as race-horses are from cart-horses'.[106] It was, therefore, essential that the wireless instruction offered by the organisation was tailored to the specific needs of clandestine W/T operators. The course had to create agents who were equally adept with radio equipment as evading the elaborate systems of direction finding employed by the Germans. As the timeframe available in which to provide W/T instruction was limited, it was essential that '[c]losest co-ordination … be maintained with the MO [Operations] section so that the specific type of duty for which the agent is being trained can be constantly borne in mind'.[107]

One technique commonly employed by SOE's wireless instructors was to arrange long distance signalling exercises. During exercise BLUFF, which commenced on 21 March 1944, two radio operators were despatched to Birmingham and Newcastle. At their safe houses, the pair were each tasked with communicating back to base, STS52, and their control station, STS47.[108] Until 25 April 1944, students were dispatched to these 'safe houses' on exercises unaccompanied. Following this date, the practice ceased. Instead, they were to be sent to Holding Schools from where they would communicate with STS52. The commandant of the specific school would be informed beforehand so they could arrange for a signal officer to supervise the student. This also ensured that the wireless equipment used

[104] TNA HS 8/370 Report on the Development of Industrial Sabotage Training at STS17 pp. 3, 6, 11-12
[105] TNA HS 8/357 Wireless Communications p. 1
[106] Ibid p. 1
[107] Ibid p. 1
[108] TNA HS 7/35 Exercise BLUFF Signal Instruction No. II p. 1

was safely returned on conclusion of the exercise.[109] On completing their training, students often requested that the equipment they had been instructed on followed them into the field.[110] This ensured the wireless operators did not encounter unexpected surprises when they began transmitting from within occupied Europe.

Figure 21: RAF Ringway, 1946. This airfield was of a typical design for the Second World War.[111]

Before these agents could begin working from the field, they would have to be transported to mainland Europe. From 1942, the main method of infiltrating operatives was by air. It was, therefore, essential that SOE provide their students with instruction in the art of parachuting. Instead of organising this in-house, the

[109] TNA HS 8/360 D.SIGS/1536
[110] TNA HS 8/357 DCDO/1220 17/08/1942. This ensured continuity and familiarity with equipment whilst operating in hostile environments
[111] English Heritage EAW000792

organisation arranged for the RAF's Parachute Training Squadron based at RAF Ringway, Manchester, to provide training on their behalf (*Figure 21*).[112] Between January and April 1941, the airfield welcomed 'with open arms the men that SOE sent them'.[113] With the large numbers of students the organisation dispatched to RAF Ringway, allocated accommodation was eventually required. Initially in 1941, students were housed in Dunham House, STS51a, and Fulsham Hall, STS51b. By March 1945, York House, STS51c, had also been added to SOE's property portfolio.[114]

Quickly appreciating the unique conditions under which SOE's agents would have to parachute, instructors at Ringway realised they would have to adapt the syllabus. As they would be parachuting into occupied territory alone, agents experienced a heightened state of nervous tension prior to jumping. It was, therefore, essential that their training focused on raising their confidence and morale. As SOE's sent students to Ringway in multinational groups, it was also necessary for the instructors to focus on the development of individualised training packages.[115] Unlike the training of Airborne Forces, SOE's agents required a more flexible approach. Training might have to be given at short notice and over a restricted timeframe. Between 12 and 16 April 1943 a party of Skiddaws[116] had 'already undergone a week's course of training at this school, but had been unable to make more than one descent owing to unfavourable weather conditions. [Consequently] They returned here [at a later date] to complete their course'.[117] Although this specialist training was provided by a third party, instructors ensured it was of an individualistic, flexible nature, in character with SOE's training programme.

[112] TNA HS 6/961 MZ/SP/1047 28/02/1941. RAF Ringway was also utilised for other of SOE's airborne requirements. On 26 October 1941, a container dropping trial at Ringway had to be postponed due to a technical fault with the Halifax (TNA HS 4/173 Notes on Visit to Ringway – 26th Oct. 1941). RAF Ringway also provided aircrews also received instruction in the dispatch of containers (TNA HS 4/173 ADDP/609 26/04/1942).
[113] TNA HS 7/174 SOE History of the Norwegian Section 1940-1944 p. 17
[114] TNA HS 8/435 History of the Training Section Chapter VI p. 30
[115] Ibid p. 30
[116] Skiddaws were Spanish republicans trained by SOE in case of a German invasion of Spain.
[117] TNA HS 6/960 Parachute training report 19/04/1943

The Nature of SOE's STSs

To provide this training, it was essential that SOE acquired a wide range of properties in which the STSs could be housed. As has been already been discussed (see pp. 5-8), during the post-war destruction of the organisation's files, those documents associated with the acquisition of property were targeted. Although the specific factors behind site selection might never be known, certain generalisations can be made. Serendipity, access to transportation networks and prior knowledge of the facilities were all likely to have played important roles in the development of SOE's STS portfolio.

It was, however, common for SOE to establish their schools within large private properties and Country Houses (*Figure 22*). This had the duel benefit of providing security and space. By locating within properties of significant size, SOE had access to buildings which could be utilised for the accommodation of large numbers of students and staff. These structures would also have capacity to support greater numbers of students as the organisation expanded their activities.

In the case of STS42, Thame Park, Oxfordshire, there were, however, issues of accommodation during 1941 despite being a Country House. In August of that year, Major THH Grayson expressed concerns with regard to the SCONCES winter accommodation.[118] It was deemed no longer feasible to provide their students with tents erected in the estate. As the provision of bunk beds or the conversion of the recreation room into barracks was felt impractical, plans were devised to construct a hut near the ablution bench.[119] Although SOE preferred to utilise pre-existing structures to billet their students, when necessary they were prepared to provide extra accommodation.

Within the large buildings requisitioned by SOE, instructors would also have access to sufficient space to establish lecture theatres and offices. Associated with all these houses were extensive estates. Access to land provided instructors with the ideal environment for training students. Located within private property far from prying eyes, prospective agents could safely be taught the art of sabotage, practice unarmed combat or tackle assault courses.

[118] SCONCES were a codename for Spanish students.
[119] TNA HS 6/961 STS/TR/41 16/08/41

Figure 22: Audley End House, home to STS43.[120]

The Nature of SOE's Training Facilities

Within the grounds of the properties which accommodated SOE's STSs, instructors provided students both standardised and specialised facilities (*Table 5*). In order to provide specialised training in clandestine techniques, it was essential that the organisation devised pioneering equipment. As SOE's training was of a reflective nature, it was necessary that these facilities could be adapted to meet new requirements. They were, therefore, designed to be of a temporary nature which could easily be changed. This also ensured that students did not become complacent. With constantly changing training equipment, they could regularly be presented with new challenges.[121]

Analysis of aerial photographs taken of STSs in 1946 failed to identify features associated with SOE. The ephemeral and temporary nature of these

[120] Author 2013

[121] As this equipment was of an ephemeral nature little, if any, physical evidence survives. The structures which do survive at SOE's STSs were pre-existing buildings the organisation requisitioned.

facilities, combined with the necessity of camouflaging them from enemy reconnaissance, meant that when structures were erected, they were often hidden (*Figure 23*). In assessing SOE's training facilities, this thesis has, therefore, had to rely on the organisation's surviving archives. When possible, this was supported by contemporary ground based photography.

School	**Standardised Training**	**Specialised Training**
Preliminary / SAB	Firing Ranges Map reading PT Weapon handling Attitude observation Psychological Tests	
Paramilitary	PT Survival Fieldcraft Demolitions Map reading Weapon handling	Fighting Houses Assault Courses Firing Ranges Close combat dummies Train Tracks
Finishing	Tradecraft Breaking and entering Counter-intelligence	Train Tracks
Holding / Operational Holding		
Specialist	W/T Industrial Sabotage Parachuting Propaganda	Industrial Machinery Train Tracks Models Vehicles

Table 5: From the beginnings of SOE's training programme, a series of stages were devised to ensure that only the most capable students progressed to further instruction. At each stage, training became more specialised and began focusing on skills specific to clandestine warfare. For certain aspects of instruction, SOE could utilise techniques and equipment developed by the Army. Certain aspects of training, however, required innovative equipment.[122]

[122] Author's diagram.

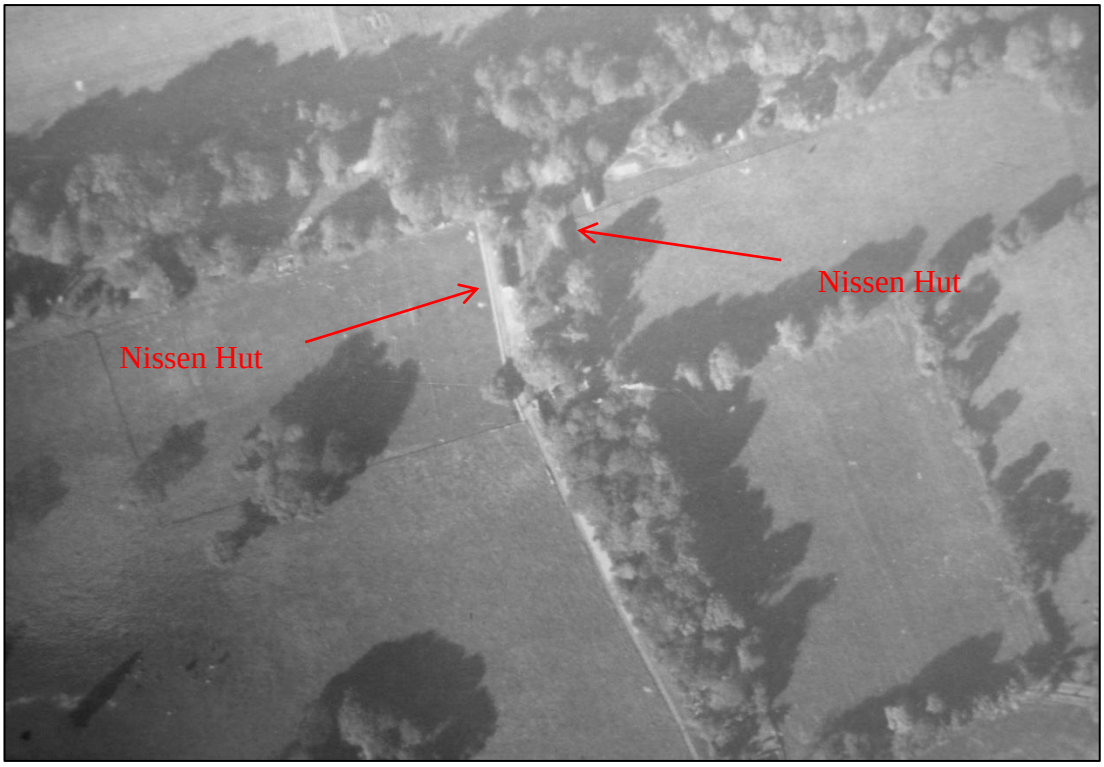

Figure 23: Aerial photograph of Gorhambury, Hertfordshire, taken in 1946. From aerial photographic analysis, it appears that it was uncommon for SOE to construct buildings at their STSs. At sites where SOE did erect structures, they appear in woodland at a distance from the main property. Further ground based survey is, therefore, necessary to determine the extent of SOE's building programme at STSs.[123]

Standardised Training

Certain aspects of preparing a student to operate within hostile territory were ubiquitous with standard military instruction. Physical fitness, survival skills and basic weapon handling were essential for both clandestine agents and soldiers alike. Due to the universal nature of this instruction, there was little scope for innovation and the development of new equipment. For most standardised training, which included map reading and fieldcraft, all SOE required was access to open space. It was only through repetition and hands-on experience that students could be taught these basic military skills.

[123] English Heritage CPE/UK1775 10/10/1946 5128

Figure 24: Polish students undergoing rope work exercises at Audley End. This piece of equipment consisted entirely of two ropes tied between two trees over the River Cam. No traces of this survive to the present.[124]

One of the main purposes of SOE's physical training programme was to increase their student's general fitness in preparation for parachute instruction. Physical exercises focused on tumbling, rope work, crossing of obstacles and hill work (*Figure 24*). These were designed to make the students supple and strengthen their torso and ankles.[125] During a parachute decent, extreme stresses are placed on the body. Without these exercises, a bad landing might lead to a medical discharge and a high attrition rate of students. Heightened physical fitness was also essential to survival for agents operating in enemy territory.

The culmination of the physical training was the assault courses established at SOE's Paramilitary Schools (*Figure 25*). These comprised of a series of specially designed hurdles and topographical obstacles. Incorporated into the course were targets which had to be engaged using weapons the students had been instructed in. Although there was no standard layout, each course was based on a narrative. Points were awarded for time, shooting accuracy and their ability to tackle obstacles. This

[124] Polish Underground Movement (1939-1945) Study Trust
[125] TNA HS 7/56 I2 p. 1

exercise was valuable as it allowed the instructors to assess the students' stamina and determination.[126]

The nature of standardised instruction meant that it could be conducted at any STS without leaving a discernible trace. Map reading and survival skills required open space whilst a source of firearms was essential for weapons handling. Through the utilisation of tried and tested methods, instructors ensured they did not waste time and effort on devising new techniques.

Figure 25: French Commando troops attempting the assault course at Achnacarry House. This free standing structure constructed of locally source timber leaves no physical trace.[127]

[126] TNA HS 7/56 I2 p. 1
[127] IWM H31422

Specialised Training

Most of the instruction provided by SOE had never formally been taught before. It was, therefore, essential that instructors devised brand new syllabuses specifically designed for the operational requirements of agents. Incorporated into these programmes were highly specialised, innovative and state-of-the-art facilities. In order to maintain the security of these techniques developed by SOE, they were only taught once students had succeeded in graduating from the preliminary stage of training.

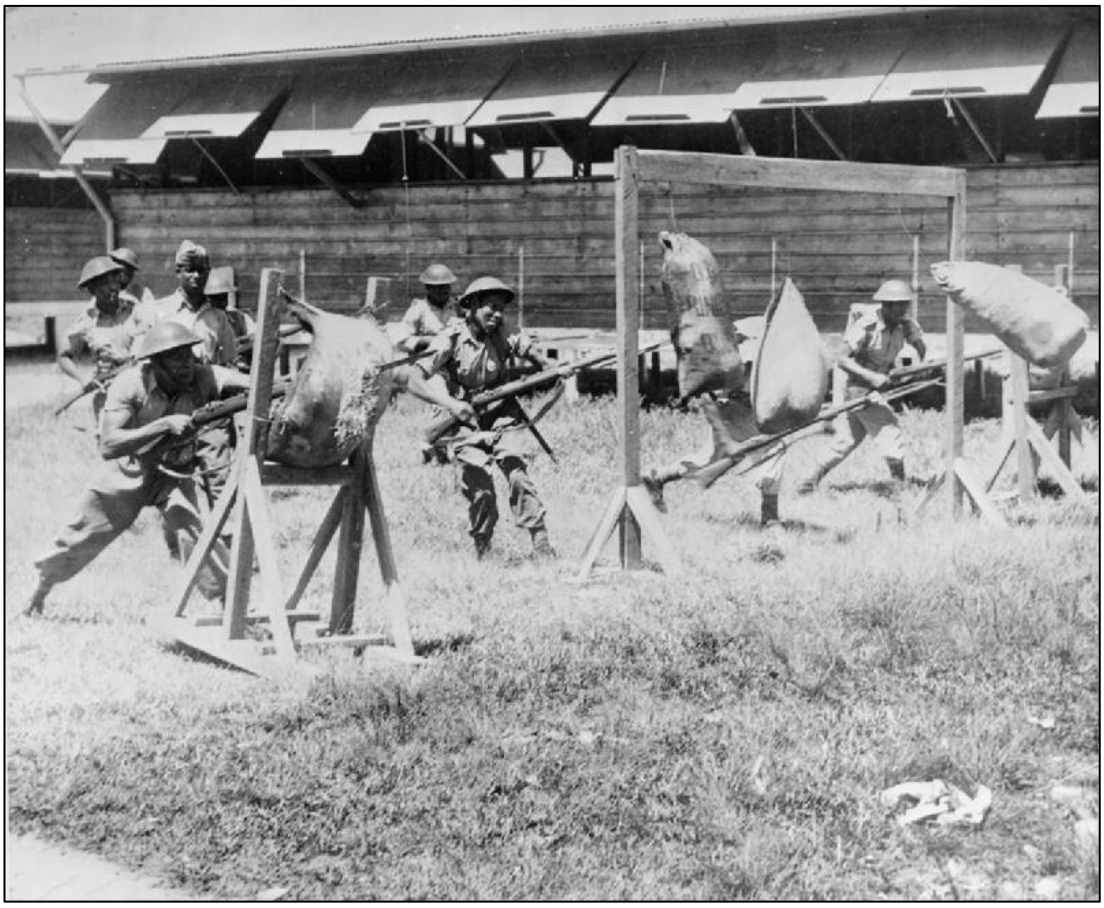

Figure 26: Trinidad units of the South Caribbean Force undergoing bayonet practice. These free standing structures leave no physical evidence.[128]

The ability of SOE's operatives to physically protect themselves was vital to their safety and the success of operations. As agents operated by themselves or as part of small groups, the individual was more highly prized than in other branches of

[128] IWM K7388

the armed services. SOE, therefore, placed a greater emphasis on the individualisation of instruction. Although the size of the army negated training at this level, the close combat training which was offered was of a dated format and avoided in large scale exercises (*Figure 26*).[129] In comparison, SOE's comparatively small classes enabled instructors to focus on the individual.

Figure 27: SOE's close combat training often involved students attacking members of staff dressed in German uniforms. This heightened the realism and made the students more professional and better fighters.[130]

In order to provide mass close combat bayonet training, the British army had to rely on the utilisation of static straw dummies. This was, however, not appropriate for SOE's students. The combat weapon of choice for the organisation's agents was a knife or cosh In order to prepare them for killing, their instructor would suspend a dummy from a pulley system. After placing the 'target' in a head lock, the dummy would be released causing the dead weight of the pair to fall to the ground. The

[129] Timothy Harrison Place, *Military Training in the British Army, 1940-1944* (London, 2000) p. 34
[130] Polish Underground Movement (1939-1945) Study Trust

student then had to continue grappling on the floor until their opponent had been 'killed'. To increase the realism of the training, on occasion their adversary would be a member of staff dressed in a German uniform (*Figure 27*). As rubber was unobtainable, the knives students practised with were constructed from suitably thick rope.[131]

As fights rarely occur between individuals, instructors taught techniques to fend off multiple attackers. In a square with dimensions 10ft x 10ft (3.04m x 3.04m), students were presented with six suspended dummies. On entering the space, they were expected to use every blow they had been taught at full speed. If undertaken successfully, the exercise should only have lasted one minute and left the student physically drained. Prior to collapsing from exhaustion, students had to exit the arena at pace.[132] The innovative nature of the equipment SOE designed for close combat training demonstrated the value the organisation placed on this skill. In enemy territory, an agent's ability to fight could save their life.

SOE's staff also provided students with instruction in the use of personal firearms. Captain William Fairbairn, Assistant Commissioner of the Shanghai Municipal Police Reserve and Training Branch, joined SOE in 1941 to instruct in the handling of guns.[133] Whilst in Shanghai, he had devised a more natural way of shooting based on the movement of the body. Quick to appreciate the value of Fairbairn's innovative technique, SOE employed him to train their students in firing 'instinctively'. On being presented with a threat, students were prepared so that they would immediately aim to kill without hesitation.[134] It was drilled into students that:

> 'a) You will always fire from the crouch position – you will <u>never</u> be in an upright position.
>
> b) You have <u>no time</u> to adopt any fancy stance when killing with speed.
>
> c) You have <u>no time</u> to use the sights'.[135]

[131] TNA HS 7/56 I4 pp. 1, 6
[132] Ibid p. 5
[133] Charles Melson, 'Introduction' in *The World's First SWAT Team: WE Fairbairn and the Shanghai Municipal Police Reserve Unit*, Leroy Thompson (London, 2012) p. 4
[134] Denis Rigden, *Kill the Fuhrer: Section X and Operation Foxley* (Stroud, 2002) p. 379
[135] TNA HS 7/56 I5 p. 4

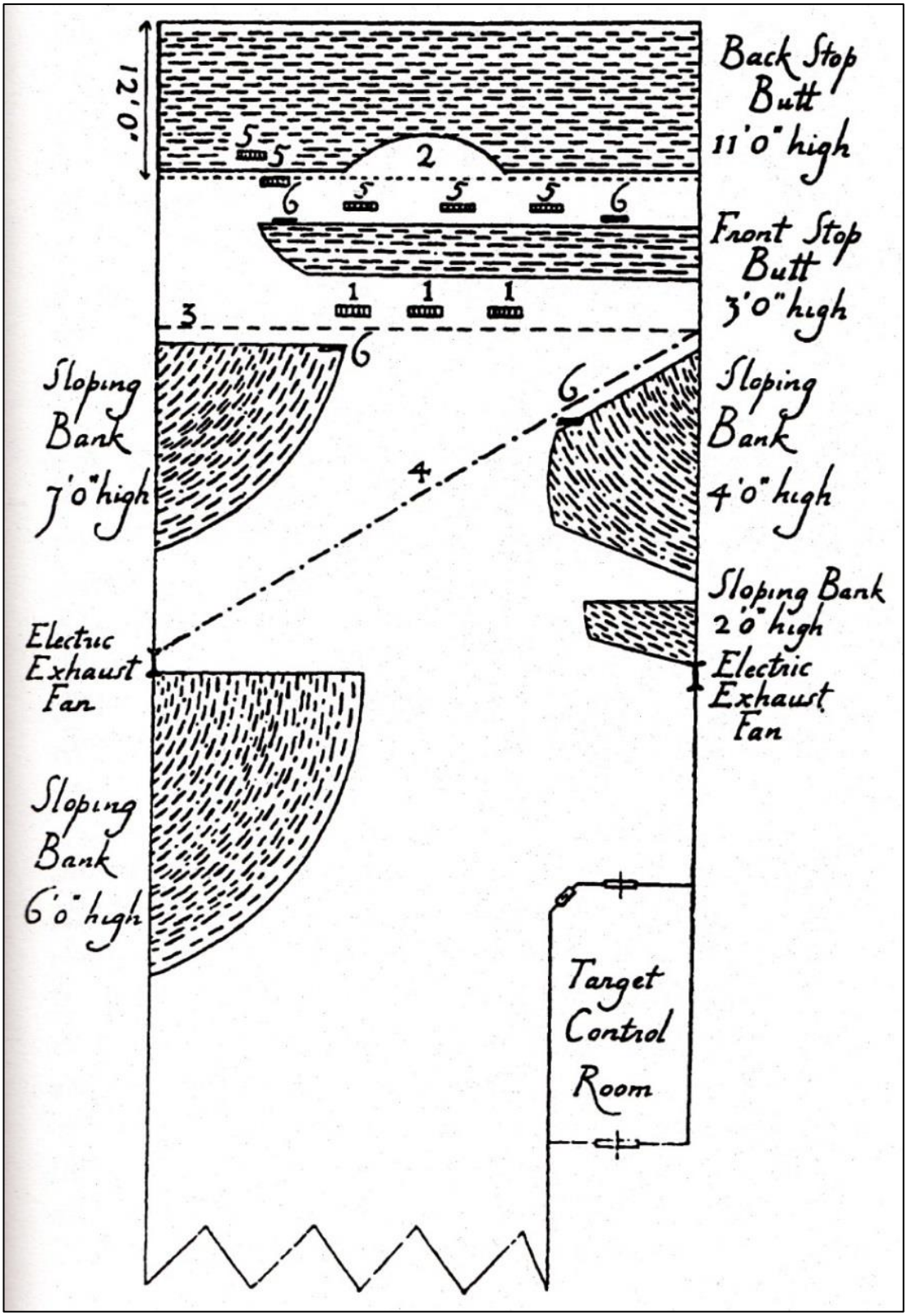

Figure 28: Example of a firing range layout as devised by Fairbairn. To test the student's ability, targets would be mobile and obstructions would be placed on the range.[136]

[136] William Fairbairn and Eric Sykes, *Shooting To Live* (Boulder, 2008) p. 65

To provide training in the use of firearms, a series of specialised targets and ranges were devised.[137] Like SOE's wider syllabus, these were designed for individual instruction. As a student gained confidence and experience, the ranges got increasingly difficult. The first 'Recruit Target' was the size of an adult male, painted field grey and with an aiming mark located on the stomach. Placed at a distance of 3yds (2.74m), it was impossible to miss. This target allowed instructors to correct faults in the students' technique.[138] On graduating from the recruit target, they then progressed through a series of ranges with varying layouts (*Figure 28*). For instruction in the use of sub-machine guns, 'Spray Targets', which consisted of a plain white sheet of canvas 7yds (6.40m) by 5ft (1.52m) with no aiming mark, were erected. As adversaries might not always be at eye level, instructors devised the 'Gallows Target'. These would be placed on platforms and in trees to provide a more realistic scenario. In a further effort to enhance the realism of the training offered, mechanisms were developed which meant that the targets were mobile.[139]

The layouts of SOE's firing ranges were not straightforward. Through the erection of screens, instructors could create alleyway scenarios in which various targets were hidden. These were constructed by erecting posts along both sides of the range. Wire was hung between these on which sheets made from split sandbags were draped. By staggering these screens, scenarios involving corridors which combined obstacles, such as doorframes, could be developed.[140] Through incorporating flexibility into their ranges, SOE's instructors ensured that their students did not become complacent.

As these ranges could only be used by a single student at a time, 'Firing Bays' were constructed nearby to keep the rest of the class occupied whilst awaiting their turn. Formed from turf, sleepers or sandbags, the wings were 5yds (4.57m) long and targets would appear at awkward angles forcing the student to turn whilst engaging.[141] Although not intended as the primary training equipment, the design of their 'Firing Bays' demonstrates the desire amongst SOE's instructors to provide the highest quality training.

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[137] Firearm practice was not always conducted on specialised ranges. At STS52, Thame Park, to limit the damage to walls caused by installing a miniature firing range within the recreation room, targets were attached to sand filled boxes (TNA HS 6/961 STS/TR/41 16/08/41).
[138] TNA HS 7/56 I5 p. 6
[139] Ibid pp. 11-2, 15, 28
[140] Ibid p. 15
[141] Ibid pp. 14-5

The most advanced range devised within SOE was the 'stalk course'. This was designed to test the students' weapons proficiency and their fieldcraft skills. Principally this was a firearms course which placed emphasis on speed of attack, control of position and the intuitive changing of position to deal with unexpected targets.[142] Ideally, the student 'should be "frightened" on to a target which hasn't been seen so that he reacts almost without thinking. He must be forced to move fast in killing a target and prevented from deliberate aiming'.[143] This style of shooting was a new concept devised by Fairbairn in Shanghai. The ranges developed by SOE were, therefore, unlike any constructed by their contemporaries.

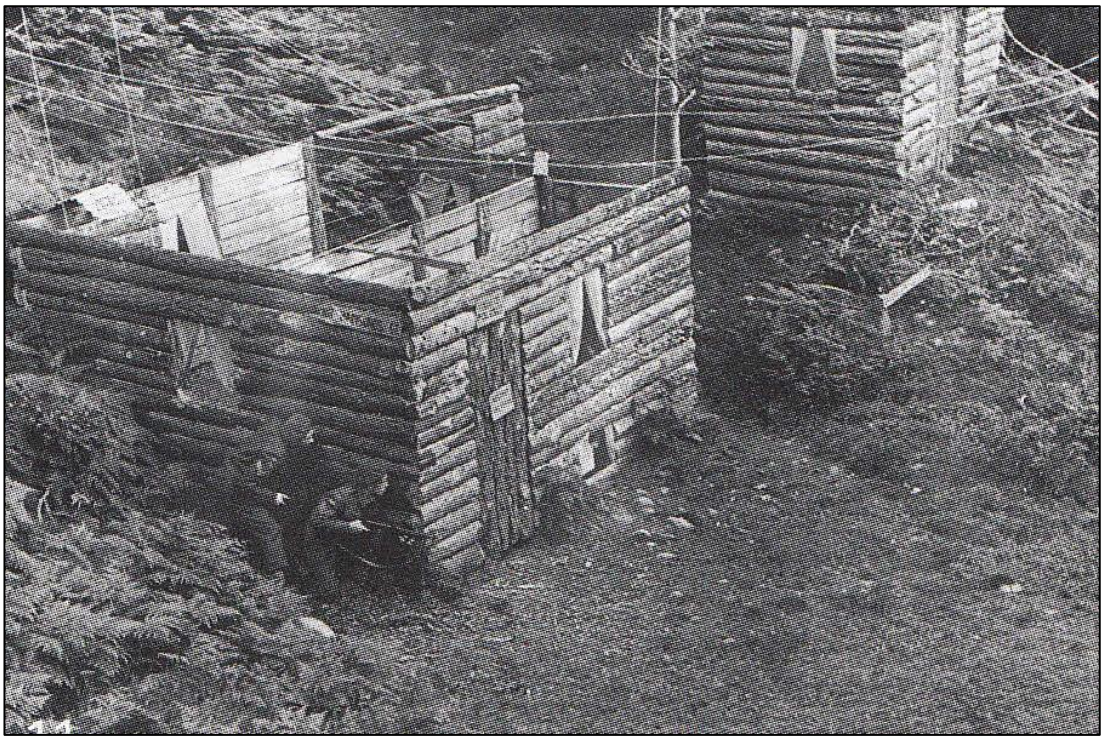

Figure 29: Linge Company training in a Fighting House Complex close to Glenmore Lodge. Wires connected to the targets are clearly visible. Internally, the partitions are moveable which enabled the instructors to constantly change the layout. The high vantage point of the camera suggests it was taken from the control tower. From these structures, the instructors could provide individual feedback.[144]

[142] TNA HS 7/56 I5 p. 13
[143] Ibid p. 13
[144] Norwegian Resistance Museum

Another training concept Fairbairn brought to SOE was the 'fighting house'.[145] The first of these innovative structures was constructed for the Shanghai Municipal Police Reserve. Inside the 'mystery house', pop-up targets, firecrackers and similar hazards were installed to enhance the students' capabilities.[146] By March 1944, SOE had developed these concepts into a highly sophisticated training complex (*Figure 29*). Due to shortages of material and labour, fighting houses were only single storey and were not quite full size.[147] These structures were constructed in positions whereby a control tower or observation point could be erected overlooking the complex.[148] From their vantage point, instructors could observe the progress of individual students and tailor feedback related to their performance.

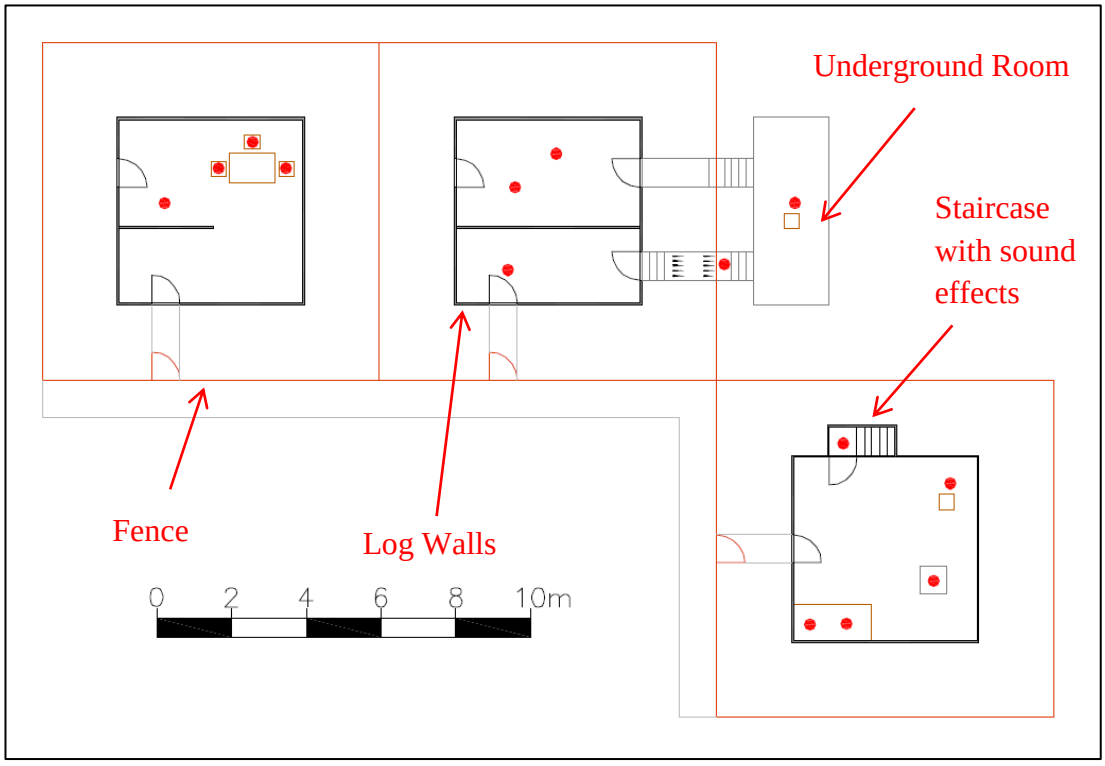

Figure 30: Although no plans of a 'fighting house' exist, this figure is based on instructions produced by STS103. Internally, the layout could be adapted to vary the training scenario. Through incorporating furniture and obstacles, a heightened sense of realism could be created. The red dots indicate the position of targets.[149]

[145] Leroy Thompson, *The World's First SWAT Team* p. 140
[146] Stuart Allan, *Commando Country* p. 53
[147] TNA HS 7/56 I5 p. 34. OSS facilities in the USA incorporated a second floor into their 'fighting houses' (John Whiteclay Chambers II, *OSS Training in the National Parks and Service Abroad in World War II* US (Washington DC, 2008) p. 252).
[148] TNA HS 7/56 I5 p. 34
[149] Author's diagram.

These structures were specifically designed to enhance a student's skills at instinctively firing whilst under stress. To ensure individuals did not become complacent, 'fighting houses' were designed so that mobile partitions could be installed. Internally, the position of furniture and the moving of targets could also change the layout. This provided the instructors opportunity to devise a wide range of training scenarios. The textbook design was for three 'fighting houses' to be grouped together within a single complex. Through the integration of fences, lamp posts, pavements and garden arrangements, a heightened sense of realism could be achieved (*Figure 30*).[150]

On entering the complex, the students were immediately on guard: threats might appear from anywhere. Targets, which were connected to pulleys and weights, were operated by a series of levers situated in the 'control tower' or automatically by hidden triggers. These might cause dummies to 'run' between buildings, appear at windows or be waiting outside a cleared building. Whilst exploring the structures, sound effects would be employed to give the sense of people moving around the interior.[151] Although one 'fighting house' had previously been constructed before Fairbairn joined SOE, the organisation turned his concept into a state-of-the-art facility.

The sense of realism which was embedded into the 'fighting house' was common throughout SOE's syllabus. To train students in the art of demolition, instructors relocated machinery to their STSs. When this was not practical, models were provided (*Figure 31*). In preparation for one of SOE's most iconic missions, the organisation smuggled the manager of the Vemork Heavy Water Plant out of Norway to provide detailed intelligence of the facility.[152] This enabled a scale model of the factory's equipment to be constructed within the grounds of STS17, Brickendonbury.[153] Not only did this provide the agents with excellent training opportunities, it also enabled engineers to design specific explosive charges for the operation.[154]

[150] TNA HS 7/56 I5 p. 34
[151] Ibid p. 36
[152] Fredric Boyce and Douglas Everett, *SOE: The Scientific Secrets* (Stroud, 2009) p. 252
[153] Charles Cruickshank, *SOE in Scandinavia* (Oxford, 1986) p. 200
[154] Fredric Boyce and Douglas Everett, *SOE* p. 252

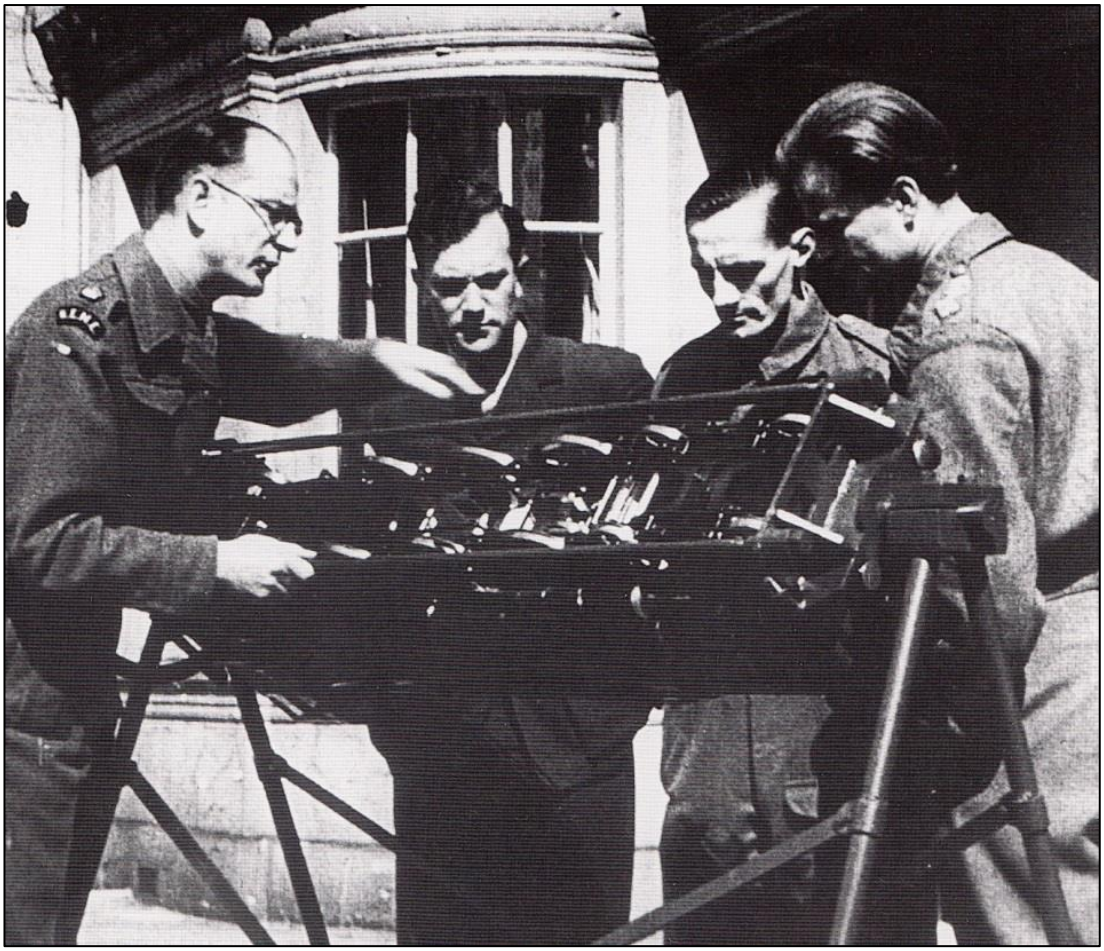

Figure 31: Instruction provided to SOE students on how to sabotage a locomotive using a model. Note the Royal Electrical and Mechanical Engineer (REME) patch of the instructor.[155]

It was also not uncommon for stretches of railway track to be laid in the grounds of STSs. These could be used for initial demolition training which would be followed up with 'attacks' on local railway stations (*Figure 19*).[156] At STS43, Audley End, Essex, the Polish Section even parked a Valentine tank within the grounds (*Figure 32*). This was used by their agents, known as *cichociemnis*, to practise techniques for destroying armoured vehicles.[157] Through the provision of models and actual machinery, SOE ensured their students' were provided with both a theoretical and practical education in clandestine warfare.

[155] IWM MH24439
[156] Cyril Cunningham, *Beaulieu* p. 43
[157] Ian Valentine, *Station 43: Audley End House and SOE's Polish Section* (Stroud, 2006) p. 76

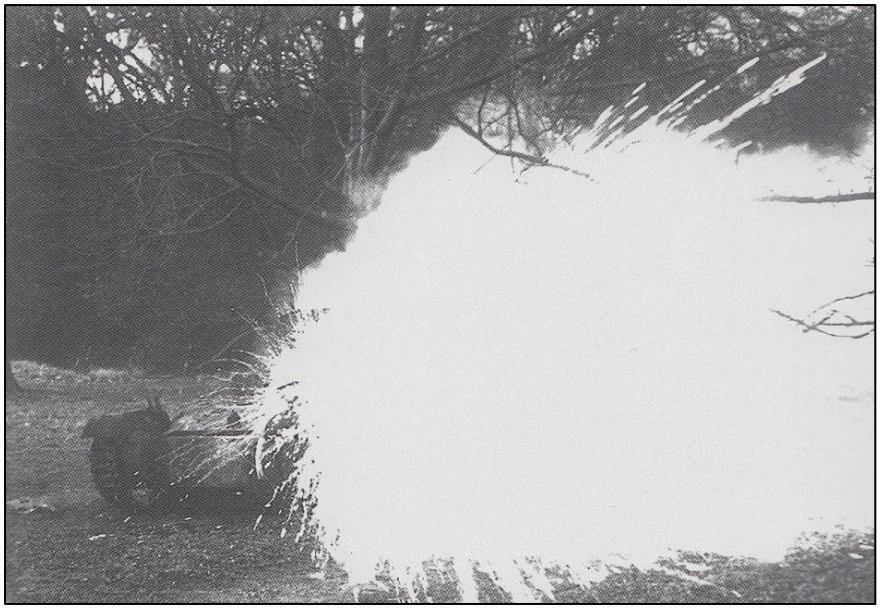

Figure 32: Valentine Tank in the grounds of Audley End being used for demolition practice. As can be observed, the vehicle was parked in woodland which camouflaged it from the air.[158]

The development of innovative, state-of-the-art and distinct training facilities designed for individual students reflects the professionalism of SOE. Without highly skilled agents, the organisation realised they would have been unable to fulfil their role. SOE appreciated that the unique nature of clandestine warfare required specialised training facilities.

Figure 33: Norwegian armoury at a STS in Scotland.[159]

[158] Polish Underground Movement (1939-1945) Study Trust

Miscellaneous Facilities found at STSs

In order to support the training of students at STSs, certain infrastructure was required. As the syllabus extensively involved the handling of firearms, live ammunition and explosives, it was essential that SOE provided armouries and magazines (*Figure 33*). At STS63, Warnham Court, Sussex, five purpose built explosives stores were constructed. The security of these buildings was, however, questionable. Between 8 and 11 May 1945, 700 No. 8 detonators were taken from one of these structures.[160] After a series of investigations, the missing items were eventually found in the possession of four local teenagers.[161] The ease of which the group managed to enter the STS and acquire the detonators raises some concerns over SOE's security measures.[162]

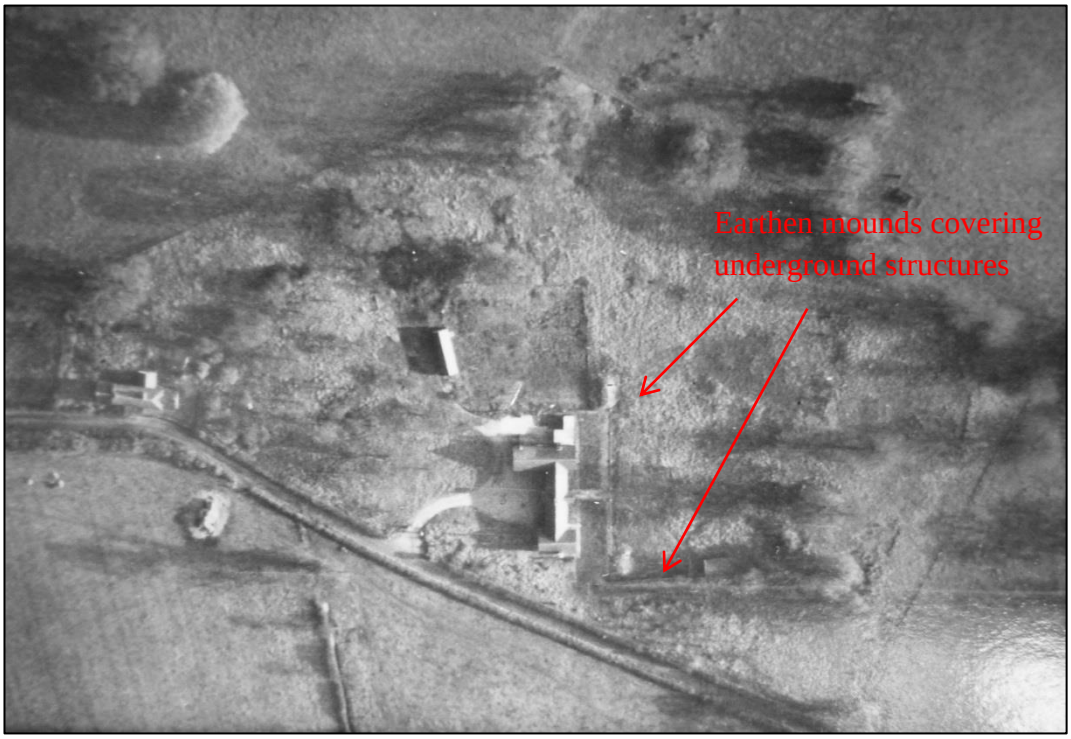

Figure 34: Aerial photograph of Frogmore Farm taken in 1945 clearly show the presence of two underground structures.[163]

[159] Norwegian Resistance Museum
[160] TNA HS 4/228 Report on the 'Breaking Into' of an Explosive store, and the loss of 700 No. 8 detonators at STS63. No. 8 detonators were commercial non-electric blasting caps.
[161] TNA HS 4/228 In continuation of my report submitted on 17 May 1945
[162] As 8 May 1945 was, however, 'VE' Day, a lapse in concentration by SOE's staff is understandable.
[163] English Heritage 106G/UK.1013 16/11/1945 7303. Access to these structures could not be gained from the landowner.

Although no architectural plans survive of SOE's magazines, structural evidence at Station 18, Frogmore Farm, Hertfordshire, illustrates one potential design.[164] In 1943 this facility began instructing students in the use of Improvised Explosive Devices (IEDs).[165] Within the grounds, two large underground structures were built (*Figure 34*). Nearby, a further five, which were approximately 2m by 20m and formed of poured concrete, were constructed within the grounds of Frogmore Hall (*Figure 35*).[166] Despite the hall being used by the Royal Military Police and the 92nd (Loyals) Anti-Aircraft Regiment,[167] their similarity with those at the farm suggest they are of SOE origin. Miscellaneous facilities at the STSs were just as important as the specialised training equipment. Without these, instruction would have been hampered.

Figure 35: Entrance to one of the underground structures at Frogmore Hall. These structures were approximately 2m by 20m and constructed of poured concrete.[168]

[164] See pp. 136-7 for further analysis of SOE's magazines.
[165] TNA HS 8/435 History of the Training Section of SOE 1940-1945 p. 65
[166] These structures were 300m south-east of Frogmore Farm.
[167] A Lovell Knight, *The Story of the Royal Military Police* (London, 1977) p. 313 and Tim McCarthy, *True Loyals: A History of 7th Battalion, The Loyal Regiment (North Lancashire)/92nd (Loyals) Light Anti-Aircraft Regiment, Royal Artillery, 1940-1946* (Merseyside, 2012) pp. 12-3
[168] Author 2012. Permission could not be granted to survey these structures.

Archaeological Remains

As this chapter has demonstrated, the equipment utilised by SOE in the instruction of their agents was of an ephemeral nature. Due to time constraints and the methodological approach adopted by this thesis, limited fieldwork could be undertaken. The nature of the archaeological remains which might be encountered will, therefore, be briefly discussed.

Documentary analysis indicates that SOE's training equipment was of a lightweight construction often manufactured from wood, presumably locally sourced. Timber was used in building the assault courses, erecting frames for the close combat dummies and constructing the fighting houses. The archaeological traces of these training facilities will mainly comprise of postholes. In comparison, the purpose built magazines SOE erected at their STSs might be of substantial construction. These could be semi-submerged, brick buildings surrounded by earthen bunds (see pp. 143-4). Excavations at the STSs will also uncover discreet areas of burning with concentrations of shrapnel and shell casings. Fragments of railway tracks and industrial machinery will also be encountered (*Table 6*).

Training Facility	**Archaeological Remains**
Fighting Houses	Postholes, timber structures, shell casings
Assault Courses	Postholes, timber frames, shell casings
Firing Ranges	Shell casings, parallel earthen banks
Close Combat Dummies	Wooden frames, rope fragments, buttons
Train Tracks	Metal fragments, discreet areas of burning
Industrial Machinery	Metal fragments, discreet areas of burning
Models	Metal fragments, discreet areas of burning
Vehicles	Metal fragments, discreet areas of burning
Magazine	Purpose built structures, either above or below ground

Table 6: Archaeological remains which might identified at SOE's STSs.[169]

[169] Author's diagram.

The Legacy of SOE's Training Facilities

The training offered by SOE in the UK epitomised continuity, flexibility, reflectivity and professionalism: it was state-of-the-art when applicable and always driven by intelligence. Despite this, the organisation was still the focus of criticism. One of the most vocal opponents of SOE was SIS.[170] It was not uncommon, however, for this organisation to send agents to SOE for training.[171] SIS also requisitioned SOE's agents for their own operations.[172] This demonstrates an appreciation of the quality of the organisation's training regime in preparing agents for a clandestine life. Following SOE's disbandment in 1946, the Training Section was absorbed by SIS.[173] Despite SIS's vocal criticism of SOE, the actions of the organisation demonstrated a high regard for the latter's training regime.

On the formation of SOE in July 1940, almost immediately a training programme was devised which, with only minor alterations, survived the duration of the war.[174] The series of 'sieves' Davies established were designed to ensure only the most capable candidates graduated to become agents. This compartmentalisation also acted as a security screen restricting access to information of an operational nature.

The greatest change occurred in 1943 when the often criticised Preliminary Schools were replaced with a SAB. This reorganisation also saw the replacement of the Holding Schools, another source of concern for the Country Sections, with Operational Holding Schools. The continuity of the training programme reflected SOE's innovative and forward thinking. Their willingness to adapt the regime also reflects a desire not to become entrenched and complacent. This demonstrated a degree of reflectivity and self-assessment.

Due to the unique nature of SOE's work and its unpredictable timeframes, instruction had to be highly flexible. Despite this, the syllabus was designed to ensure that all the basic skills were covered. Modules were not, however, rigidly enforced and could be tailored to individual or operational requirements. Feeding

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[170] Michael Foot, 'Was SOE any good?', *Journal of Contemporary History*, 16.1 (1981) p. 172
[171] Philip Davies, 'From Special Operations to Special Political Action: the "rump SOE" and SIS post-war covert action capability 1945-1977', *Intelligence and National Security* 15.3 (2000) pp. 55, 62, 63
[172] TNA HS 8/321 C.D.'s weekly meeting with C.S.S., April 25th and TNA HS 4/63 MX/CZ/72 14/02/1943. The fact that SIS requisitioned SOE agents is not wider appreciated.
[173] Philip Davies, 'From … ' pp. 55, 62, 63. SOE's Training Section replaced SISs.
[174] William Mackenzie, *The Secret History of SOE* p. 729

into these syllabuses was intelligence gathered from returning agents, sister agencies or members of the resistance.

Providing this instruction, SOE leaned towards employing staff who lacked a traditional 'military' schooling. This brought to the organisation fresh thinking and innovative ideas. SOE's preference for employing 'outsiders' was inherited from MI(R). It was their opinion that regular officers were unsuitable for irregular operations. Instead they preferred to commission personnel straight from the ranks or directly from civilian life.[175] The new style of instructor embedded into SOE's training a heightened sense of realism. By preparing for all eventualities under pseudo-operational conditions, the organisation was increasing an agent's probability of success.

This chapter has demonstrated that over a short timeframe, SOE developed a state-of-the-art training programme for a method of warfare which had never previously been formally taught. It was not, however, only agents which needed to be prepared for operations in enemy occupied territories. To ensure their operatives could work effectively, SOE had to develop equipment specifically intended for clandestine warfare. The organisation's Research and Development facilities are the subject of the next chapter.

[175] Simon Anglim, 'MI(R), G(R) and British covert operations, 1939-1942', *Intelligence and National Security* 20.4 (2005) p. 635

Chapter IV
Research and Development

The quality of training received by agents was virtually worthless if SOE could not provide them with equipment specifically designed for their new and unique role. On the disbandment of the organisation in 1946, the 'gadgets' they designed remained highly classified. Often innovative, state-of-the-art and bespoke, this equipment was specifically intended to undermine the moral and efficiency of a numerically superior force operating from 'home' territory (*Figure 36*). If these designs fell into the hands of communists, anarchists, fascists, terrorists or criminal gangs, the implications would be unfathomable. It was, therefore, essential that the Secret Services ensured this did not happen. The British Government finally published the catalogue of SOE's equipment in 2008.[1]

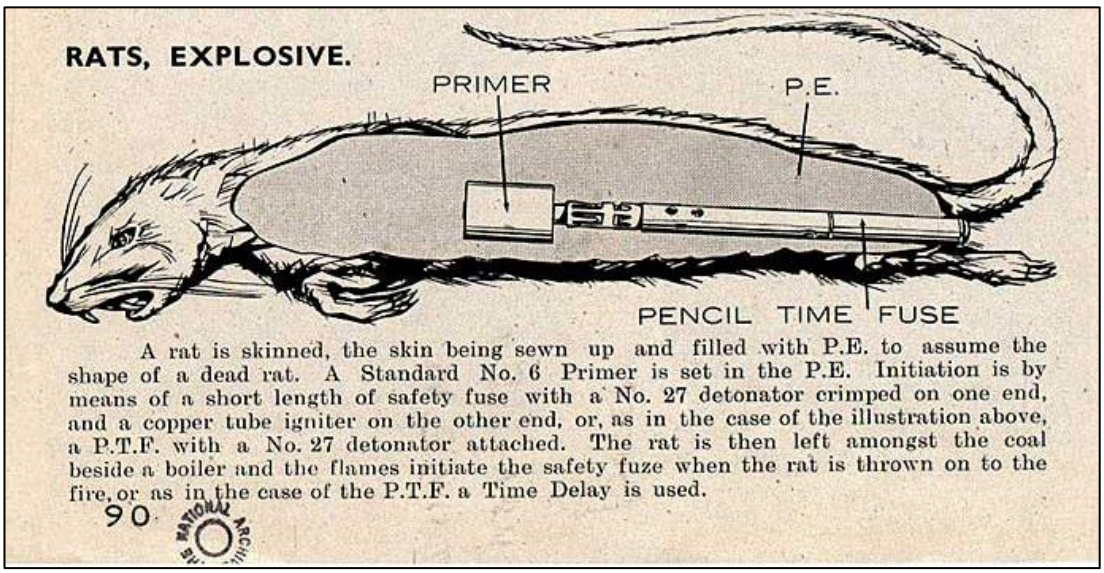

Figure 36: An explosive rat designed by SOE. In order to operate effectively, it was essential that SOE's agents had access to bespoke, innovative and state-of-the-art equipment.[2]

[1] The National Archives, Se*cret Agent's Handbook: The Top Secret Manual of Wartime Weapons, Gadgets, Disguises and Devices* (London, 2008) p. 181
[2] Ibid p. 181

The organisation's Research and Development Section was not, however, purely focused on designing new and innovative equipment: an important element of their work was devising inventive methods of concealing compromising items.[3] Without some form of camouflage, equipment which was essential to an agent's role could undermine their efforts at 'passing' in occupied territory.

Specialist equipment purposely designed for clandestine operations was vital to the activities of agents and resistance organisations worldwide. As weapons had been confiscated by the occupying German forces, it was essential that the resistance was supplied with new equipment from the UK. Without these supplies, activities would have mainly been confined to 'passive' resistance.[4] This chapter assesses the facilities SOE provided their scientists and engineers for the purpose of developing innovative equipment for clandestine warfare. By allowing their staff a high degree of autonomy, the organisation designed a wide spectrum of items. The organisation did, however, maintain the capability of developing bespoke equipment to tight deadlines and to a high standard.

The History of SOE's Research and Development Facilities

The Research and Development Section of SOE was not static over the course of the Second World War. Up until 1941, the department was relatively small. The following year, however, saw the section rapidly grow as increasing demands were placed on its laboratories. By 1942, all the necessary internal reorganisations had been completed and the Research and Development Section had taken its final form. From this point until 1944, the department was operating at its maximum activity.[5]

[3] The camouflaging of material was undertaken at Station XVb, the Natural History Museum, and Station XV, The Thatched barn. Both these facilities had duel functions and, as such, are covered in other chapters of this thesis.
[4] Passive resistance, which included propaganda and strikes, were an important element of the work of SOE as it reduced manufacturing output and lowered the occupiers' moral. Active resistance, which included assassinations and sabotage, however, had a visible impact and could achieve demonstrable strategic objectives.
[5] TNA HS 7/27 History of the Research and Development Section of SOE p. 1

Figure 37: Composite map of SOE's Research and Development facilities during the Second World War. The key facility was located at The Frythe. Research conducted at the other properties was ad hoc *and of a limited capacity.*

On the formation of SOE in July 1940, the organisation inherited a small number of facilities associated with early attempts at developing clandestine equipment (see pp. 31-8). It was from this core that SOE's Research and Development infrastructure expanded (*Figure 37*). Unlike other aspects of the organisation, Research and Development was not a geographically delimited activity: work could occur in isolation assuming SOE provided their staff with access to laboratory and engineering facilities onsite. To undertake this research, the organisation employed university scholars, members of the armed services and those who had previously been employed in the private sector.

Prior to 1939, Section D had already begun developing simple devices for the purpose of sabotage. These were to form the basis of SOE's toolkit. One of the most important designs they came up with was the 'Pencil Time Fuze' (*Figure 38*). This was to become the standard time delay fuze utilised by the Secret Services throughout the war. During this early period, Section D subcontracted research and development out to Mr Bailey based at University College London. The organisation also placed contracts with the Royal Arsenal, Woolwich, the British Scientific Instrumental Research Association, the Royal Society, Imperial Chemical Industries and Shell Oil.[6] This early phase in the development of clandestine equipment laid the foundations for later work and provided a number of key items to SOE's arsenal.

Figure 38: Pencil Time Fuze Within this fuze, a striker was held back by a steel wire kept under tension. Once a glass amopule was broken, a corroding solution was brought into contact with the wire. When the wire broke, the striker was released and operated a percussion cap attached to a short Bickford fuse.[7]

By the time SOE was formed, Section D had already established workshops and laboratories at The Frythe and Aston House (*Figure 39*). Although The Frythe had previously focused on wireless research, the high premium for space during the early stage of the war meant it rapidly became SOE's research and development hub. It was within this facility that the organisation's scientists and engineers designed a wide range of items including the Welbike,[8] the Welgun,[9] the Welrod,[10] the Welbum[11] and the Welmine (*Figure 40*).[12]

[6] TNA HS 7/27 History of the Research and Development Section of SOE pp. 1-3
[7] IWM MUN1967 and Fredric Boyce and Douglas Everett, *SOE: The Scientific Secrets* (Stroud, 2009) p. 57
[8] A folding motorcycle.
[9] A submachine gun.
[10] Bolt action, magazine fed, suppressed pistol.
[11] Motorised swimmer for people parachuting into water.

Figure 39: The Frythe, Station IX, home to SOE's main research and development centre. Within the grounds, the organisation constructed numerous workshops, laboratories and testing facilities.[13]

Figure 40: Over the course of the Second World War, SOE's scientists and engineers developed a wide range of equipment for clandestine warfare. These included explosives, incendiaries, small arms (the photograph is of a Welrod), motorcycles, electricity generators, wireless sets, itching powder and stimulants.[14]

[12] A motorised mine. Fredric Boyce and Douglas Everett, *SOE* pp. 291-2.
[13] Hertfordshire Countryside Magazine
[14] IWM FIR 3801

By the end of 1940, production of the devices which had been developed in the early stages of the war had reached a considerable scale.[15] Despite these successful designs, work continued on improving them. In keeping with their predecessors, SOE was willing to collaborate with external bodies that possessed world class expertise. By December 1941, the University of Cambridge were undertaking research into incendiaries on behalf of the organisation. This was being led by 'Professor Norrish … [who] is a very practical man and has considerable energy. Norrish is satisfied that the substances we are researching are likely to prove useful though, of course, like everything else, the research may prove a failure. So far, however, the results are promising'.[16] Dr Reich of Imperial College was also conducting research on behalf of SOE. His endeavours were focused on a new volatile compound which potentially had twice the cutting power of any contemporary explosive.[17]

Over the course of the Second World War, SOE's Research and Development Section changed and adapted as circumstances required. The rapid growth of the organisation in 1941 placed increasing demands on their research facilities. This resulted in an internal reorganisation. As SOE's predecessors had designed the basic tools of clandestine warfare, the organisation's laboratories and workshops could begin focusing on equipment intended for specific operations. As the organisation continued to expand in 1942 and 1943, further reorganisations of the department occurred.[18]

The Nature of SOE's Research and Development Facilities

To support their scientists in the designing, developing and testing of new equipment, it was essential that SOE provided them with sufficient resources and facilities. Although a wide range of items were developed (*Table 7*), this section will mainly focus on the facilities developed for certain prestigious ventures. Despite being established for specific projects, they provided greater capacity for SOE's

[15] TNA HS 7/27 History of the Research and Development Section of SOE p. 6
[16] TNA HS 8/334 Services Directorate and 'U' Section ADZ/OR/730 25/12/1941 p. 1
[17] Ibid p. 1
[18] TNA HS 7/27 History of the Research and Development Section of SOE pp. 8-9

scientists and engineers. The following section has been arranged so that the nature of each facility is assessed separately.

Underwater and Marine Devices	
In Production	**Developed but not Produced**
Welman (One-man submarine)	Welmine (magnetic)
Sleeping Beauty (underwater canoe)	Welmine (jettison-head)
Silencer for outboard motor	Towing container (water)
Silent power unit canoe with flexible drive	Smoke screen to operate from robot motorboat
Suction-adhesion device for limpets	Camouflaged oil drums with depth charges
Nail firing device for charge adhesion to steel/wooden ships	Limpet (stream-lined)
Small Arms and Other Weapons	
In Production	**Developed but not Produced**
Sten, Silenced Mk II	Welgun
Welrod Mk IIA	Small calibre machine carbine
Sleeve Gun	Machine pistol Type I Mk II
Silent 9mm Welrod	Silent 9mm Machine Gun
Welsilencer	Silent 9mm Luger Pistol
Blowpipe	Welpen (.22 fountain pen pistol)
Miscellaneous	
In Production	**Developed but not Produced**
Welbike (folding motocycle)	Device for crossing dannert wire fence
Skeleton Keys	2" mortar grapnel device for mine fields
Axle box grease gun for use with abrasives	Welbike trailer
Collapsible bridge	Smoke screen to operate from Welbike

Table 7: Throughout the Second World War, SOE's Engineering Section developed a wide range of equipment. This table is just a selection of their entire catalogue.[19]

[19] TNA HS 7/27 Appendix A DMN/7366 List of Devices Developed by the Engineering Section pp. 1-2. The 'Wel-' prefix denotes equipment which was designed at The Frythe, Welyn.

Station IX, The Frythe, Welwyn

On 26 August 1939, the staff of The Frythe Residential Private Hotel were informed that the property was being requisitioned by the military. They had until 20:00 to vacate the building.[20] Quick to move in, Section D based their Radio Communication Division at the facility following the declaration of war in September.[21] This property was also used to store their 'records (to keep these clear of any danger in London), such of the staff as necessary to deal with these records and part of the Drawing Office and Planning Department, since these branches must have access to all papers'.[22] In the event of enemy activities making London no longer safe for the organisation, the majority of Section D's staff were also to be evacuated to The Frythe.[23]

Over the winter of 1939, Section D's Radio Communication Division settled into their new accommodation.[24] In July of the following year, The Frythe was transferred to the infant SOE. Whilst finding their feet, the organisation maintained the *status quo*. This included upholding the established plan to utilise the property as an evacuation centre.[25] SOE also started to use the site as billets for some of their London based staff. Each morning at 07:45, a shuttle bus would leave the property destined for the organisation's London offices. At 17:15 sharp, the bus would begin its return journey. During this period, SOE maintained strict working hours and expected everyone to have left the office by 17:00.[26] Every officer and secretary was also 'expected once a week to take a Luncheon from 13.00 to 14.30 hours to enable them to see friends, do shopping'.[27]

This state of affairs was maintained until the beginning of 1941, at which point, various schemes for the reorganisation of the Research and Development Section were considered. One idea involved moving the entire research side of SOE to The Frythe.[28] This would involve relocating the Technical Department from Aston

[20] Fredric Boyce and Douglas Everett, *SOE* p. 15
[21] TNA HS 7/46 Radio Communication Division p. 1
[22] TNA HS 8/334 Letter to Jebb 05/08/1940
[23] Ibid
[24] Fredric Boyce and Douglas Everett, *SOE* p. 15
[25] TNA HS 8/334 Emergency Evacuation covering 64, Baker Street, Michael House and 5, Porchester Gate 21/04/1941 p. 3
[26] TNA HS 8/334 Office Hours 15/10/1940
[27] Ibid
[28] TNA HS 7/27 History of the Research and Development Section of S.O.E. p. 7

House, Station XII, Hertfordshire, to the property.[29] Aston House would then focus its efforts on production, routine inspection, packing and the despatch of stores. Following the appointment of Professor Dudley Newitt MC, formerly of Imperial College London, as Director of Scientific Research (DSR) on 9 June 1941, the division of work at Aston House was put into effect.[30]

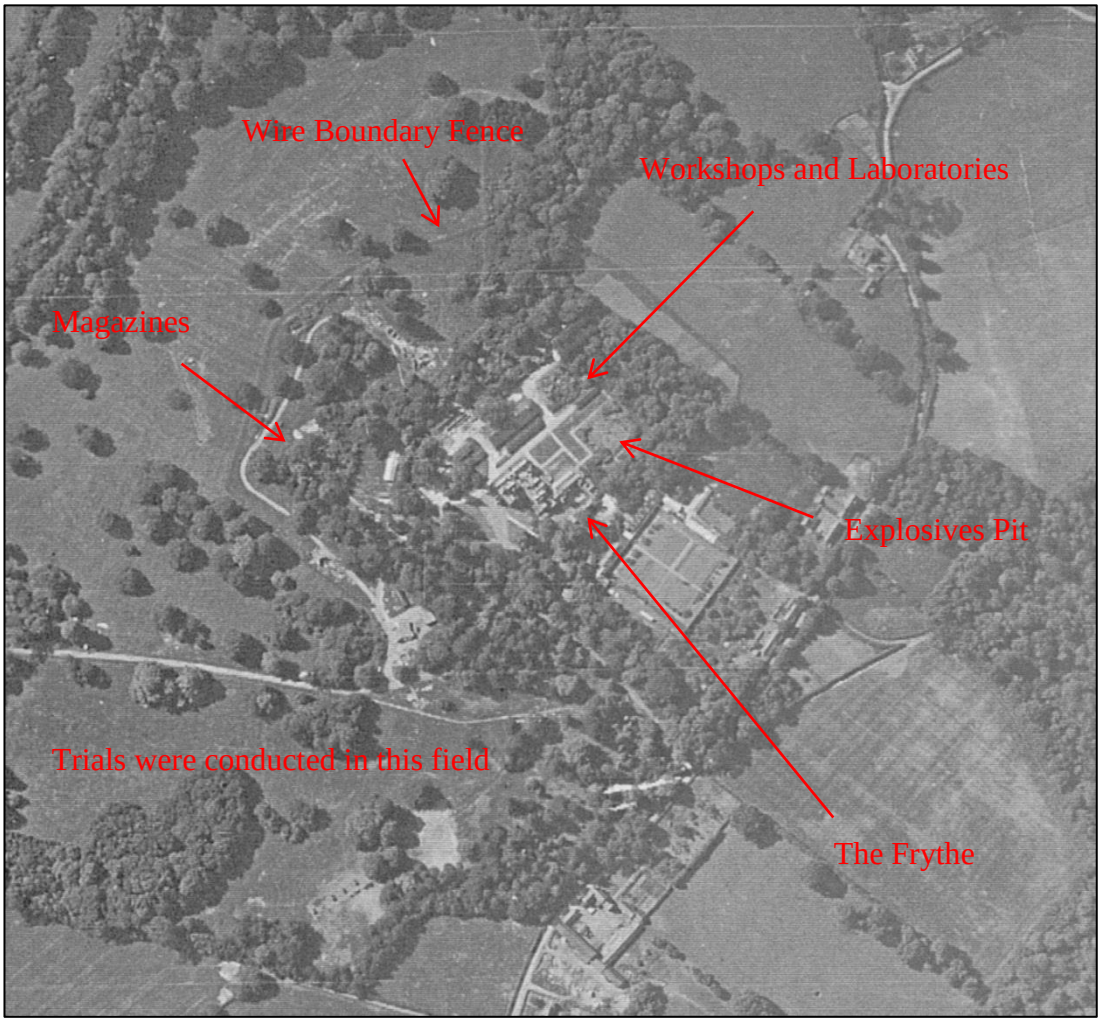

Figure 41: The Frythe in 1946.[31]

To accommodate the arrival of the research sections, 'temporary' structures were erected in the grounds of The Frythe (*Figure 41*).[32] These were single-storey, prefabricated, felt-roofed wooden huts and typically measured 35ft x 15ft (10.67m x

[29] TNA HS 8/334 Letter to Jebb 05/08/1940
[30] TNA HS 7/27 History of the Research and Development Section of S.O.E. p. 7. See Chapter V: Supplies.
[31] English Heritage RAF CPE UK 2135 3109. Access to the site was not granted for this thesis.
[32] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) – otherwise known as Station XII p. 1

4.57m) (*Figure 42*). Internally, the huts were conventionally partitioned into smaller workspaces (*Figure 43*). Typically they were organised into two laboratories, a specialist room and two small offices. Heating to these structures was provided by a steam boiler plant constructed in the grounds.[33]

During this reorganisation, the Wireless Section based at The Frythe was assessed to be in urgent need of expansion. On 26 June 1941, the Director of Research, Development and Supply (AD/Z) requested that the number of mechanics at this facility should be increased. These personnel were required so that trials of the 'micro-wave telephonic duplex communication ground-to-air set' and the 'D-Phone' could be conducted. As SIS had recently been allocated 18 engineers, AD/Z felt his demand for 'three electrical mechanicians [*sic*] capable of handling precision bench machinery and who could work to drawings and specifications' was not unreasonable.[34]

Figure 42: Hut in the grounds of The Frythe. The first structures constructed at this facility were single-storey, prefabricated wooden huts roofed with felt.[35]

[33] Fredric Boyce and Douglas Everett, *SOE* p. 16
[34] TNA HS 8/358 ADZ/XX/510 26/06/1941
[35] Elizabeth Howard-Turner

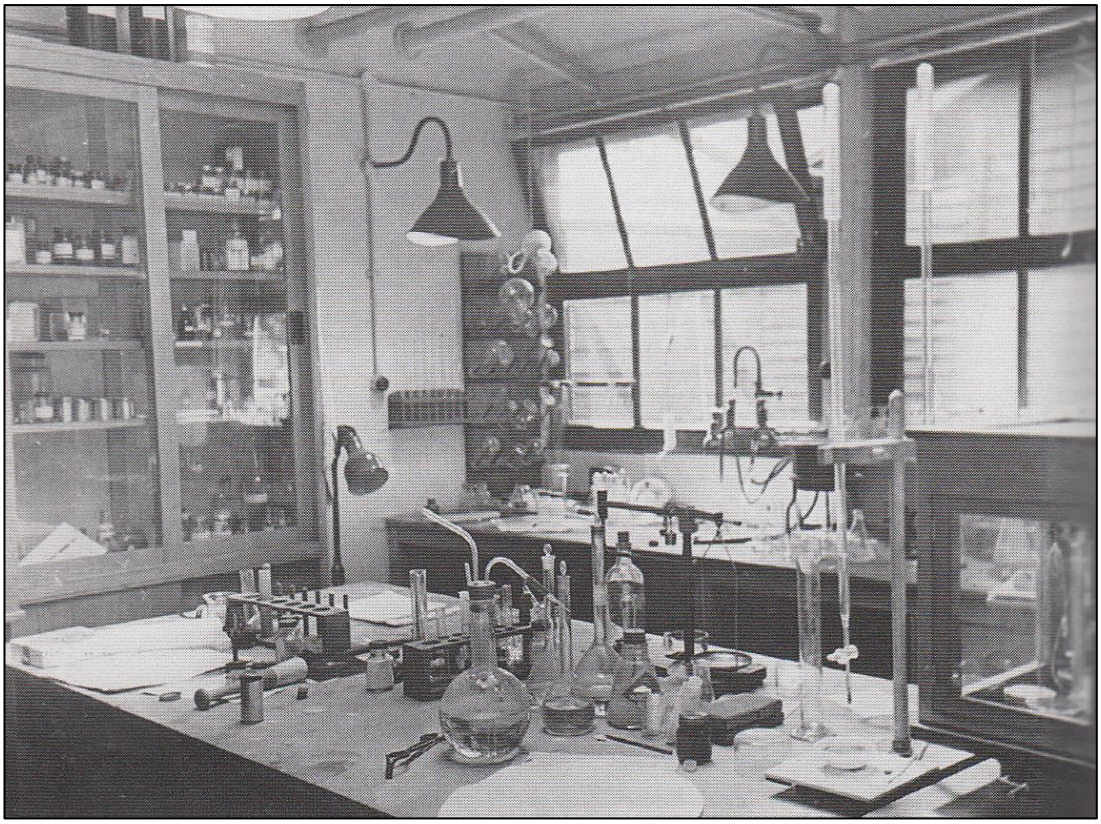

Figure 43: Interior of the Chemical Laboratory. This structure was well equipped with various items which SOE's scientists might require in their work.[36]

With the expansion of SOE in 1941, increasing demands were placed on the laboratories and workshops at The Frythe. It was, therefore, deemed essential to undertake a further reorganisation of the facility. This resulted in the formation of six new sections:

> 'Section 1. Operations (including large scale trials)
> Section 2. Explosives (including fuzes, switches and delays)
> Section 3. Incendiaries, flares, smokes.
> Section 4. Technical Sabotage
> Section 5. Bacteriology and Toxicology
> Section 6. Camouflage (including home-made devices)'.[37]

During this reorganisation, it was necessary 'to make provision for a possible extension of S.O.E. activities should the enemy infringe internal law in the use of poisons, gases and bacteria'.[38] To support these new sections, machine, carpenters'

[36] Elizabeth Howard-Turner
[37] TNA HS 7/27 History of the Research and Development Section of S.O.E. p. 8
[38] Ibid p. 8

and sheet metal shops and a photographic department were all provided onsite.[39] Later that year, an Engineering Section was formed with the responsibility of servicing the laboratories. Its secondary function was to manufacture small mechanisms or devices as and when required. As requests from the laboratories fluctuated, the Engineering Shop was also provided the freedom to independently develop clandestine equipment.[40]

Throughout 1941, the Engineering Section operated from a single small shop of a mere 600ft^2 (55.74m^2). As the workload of this department gradually increased, a substantial expansion in workspace was necessary. SOE, therefore, began construction of a large carpenters shop and a new sheet metal shop of 1,200ft^2 (111.48m^2). In 1942, the Engineering Section were provided with a further 2,400ft^2 (222.97m^2) of space at The Frythe. Further facilities were also constructed as and when required.

Figure 44: A Welman being lifted out of a hangar located in the grounds of The Frythe.[41]

[39] TNA HS 7/27 History of the Research and Development Section of S.O.E. p. 8
[40] TNA HS 7/27 Appendix E Research and Development Organisation: Short History of Engineering Section Station IX since August, 1941 p. 1
[41] IWM HU 56768

Following the entry of the Soviet Union into the war in June 1941, the German battleship TIRPITZ, which was stationed in the Baltic, became of increasing strategic concern. On reviewing their operational procedures, SOE determined that a new approach was required if they wished to remove this threat. The solution, as determined by the organisation, was the development of a 'one-man' submarine.[42] Following successful trials, SOE began 'mass production of this device, and as a preliminary step it was decided to erect hangars [at The Frythe] giving some 5000 sq. ft. [464.52m^2] of space to build the first twenty[43] and to cover the unavoidable delay in obtaining the external mass production' (*Figure 44*).[44]

Figure 45: Exterior of the Thermostat Hut at The Frythe. Unlike the wooden, prefabricated structures which characterised the early development of the facility, this structure was of brick construction.[45]

[42] This submarine is discussed in further detail later. See pp. 114-7.
[43] By 20 July 1943, two-man Welmans were being manufactured at The Frythe (TNA HS 8/799 Two Man Welman for Training SM.04353/432 20/07/1943).
[44] TNA HS 7/27 Appendix E Research and Development Organisation: Short History of Engineering Section Station IX since August, 1941 p. 2
[45] IWM Document 12893 Operation and Maintenance Manual for the Thermostat Hut at Station IX, 1945 p. 1

Between August 1941 and September 1944, the Engineering Section grew from four to 160 personnel. Over the same timeframe, their workshops expanded by 19,600ft^2 (1,820.9m^2).[46] It is evident that SOE invested significant resources into the Research and Development Section's Engineering Department. This ensured the organisation had the capacity to support their staff developing new and innovative equipment for their agents abroad.

Figure 46: Interior of the Thermostat Hut. The room in the foreground is the analytical and plating laboratory, in the background, the thermostat room. The laboratory was well equipped with standard equipment which included a physical balance, jigs, soldering and glassblowing equipment, inorganic reagents together with specially prepared inorganic solutions, organic solvents, fume cupboards, a Gallenkemp Oven, a smaller oven and a refrigerator.[47]

In 1944, the capabilities of The Frythe were further enhanced with the construction of a new specialist facility. Known as the 'Thermostat Hut', this was designed to provide a number of constant-temperature environments (*Figure 45*).

[46] IWM Document 12893 Operation and Maintenance Manual for the Thermostat Hut at Station IX, 1945 pp. 1-2, 3
[47] Ibid pp. 11, 12, 13, 14, 16

This provided SOE's scientists the opportunity to research the influence of temperature and humidity on their equipment. Unlike the other structures at The Frythe, the Thermostat Hut was of a substantial construction.[48] The external walls were 0.36m thick and constructed from bricks and roofed with corrugated asbestos. Internally, the five rooms were partitioned by 0.11m brickwork. These rooms comprised of a laboratory, which was equipped with compressed air, vacuum, and hydrostatic pressure test apparatus, an analytical and plating laboratory, two offices and the thermostat room (*Figure 46*). Within this room, five thermostats were installed which provided constant temperature environments between -20^{o}C and 40^{o}C (*Figure 47*).[49]

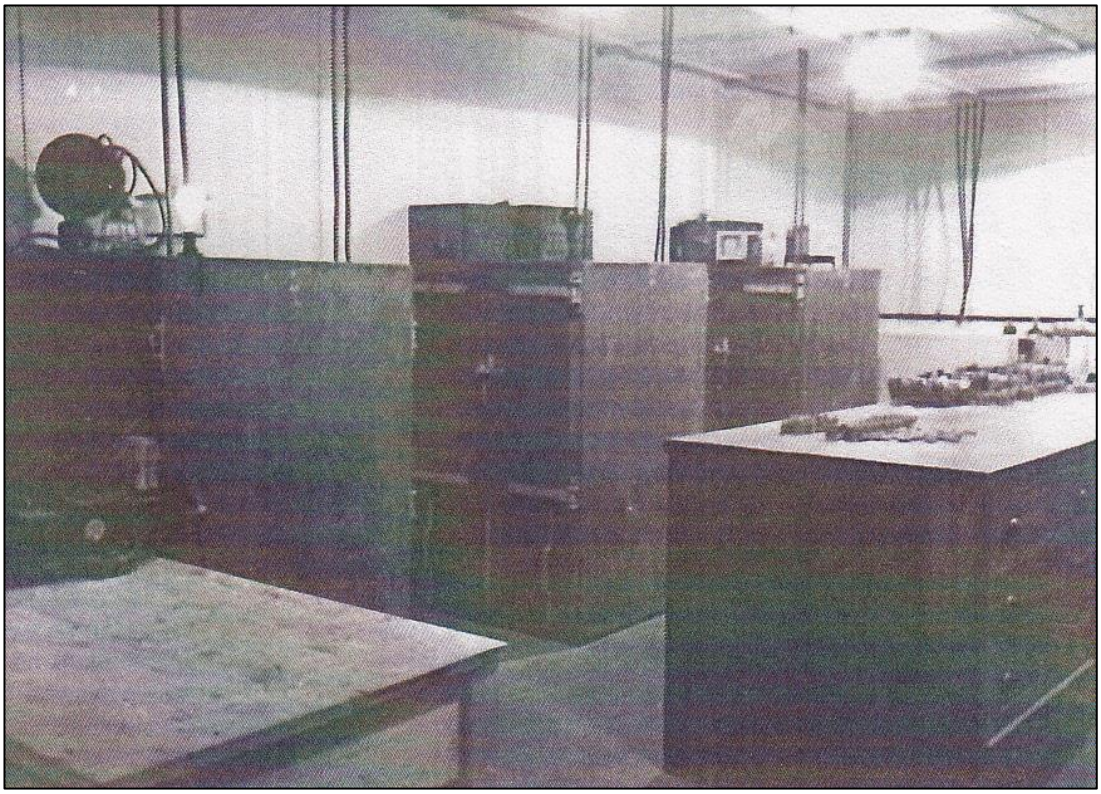

Figure 47: The thermostats within SOE's Thermostat Hut. These could provide SOE's engineers and scientists a constant temperature environment which could be set at between -20^{o}C and 40^{o}C [50]

It was the responsibility of John van Riemsdijk to ensure the apparatus within the Thermostat Hut was maintained to a high standard. Before the employment of

[48] Fredric Boyce and Douglas Everett, *SOE* pp. 16, 90
[49] IWM Document 12893 pp. 4, 11, 12, 13, 14, 16
[50] Ibid p. 13

van Riemsdijk, this task had been neglected. When he first entered the structure, he found that 'much of the apparatus was in a half complete state, and of the usable equipment 50% was out of order. There were at that time no wiring diagrams or descriptions to guide him in the work of restoring it to its former condition'.[51] Despite SOE providing their staff with specialist equipment, the maintenance of these facilities was not always to a professional standard.

Essential to any research and development is the trialling of prototypes. Within the grounds of The Frythe, various facilities were provided to undertake necessary tests.[52] In order to experiment with maritime equipment, a large tank was constructed on the estate (*Figure 48*). On successfully passing these tests, further trials were conducted at Queen Mary's Reservoir, Staines.

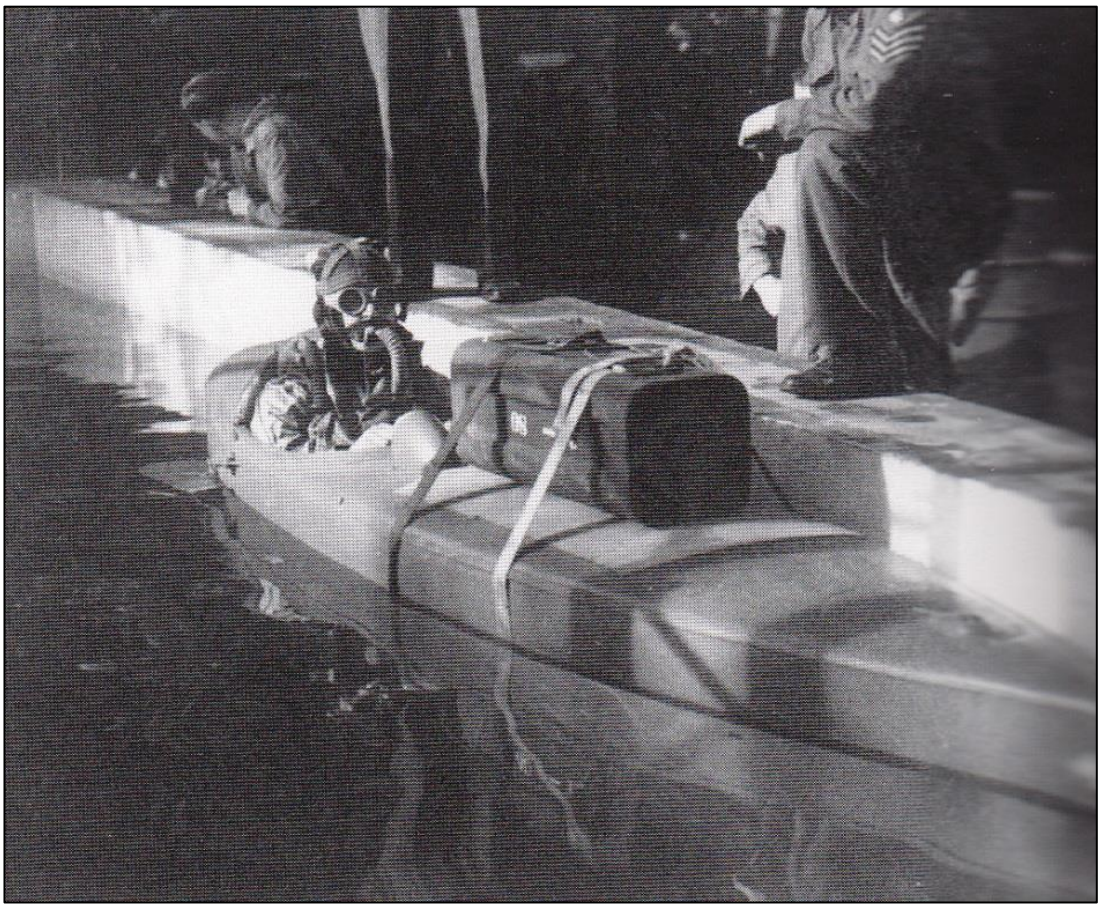

Figure 48: A 'Sleeping Beauty' being tested in the tank in the grounds of The Frythe.[53]

[51] IWM Document 12893 p. 2
[52] Trials were not confined to The Frythe, they were also conducted at SOE's other properties around the UK.
[53] IWM HU 56775

Facilities were also provided at The Frythe to test designs of air delivery mechanisms for aircraft. By 18 February 1945, the fuselage of a Stirling bomber had appeared within the grounds. In this aircraft, SOE's engineers installed a prototype conveyor. This was used to investigate methods of increasing the mobility of packages on the rollers. The simplest technique was to construct 'toboggans' with a light wooden framework. This would allow the two despatchers to unload 1,760kg of stores in 11 seconds. Concerns were, however, expressed over the security implications of scattering toboggans across the drop-zone.[54]

Facilities were also provided at The Frythe which allowed staff to experiment with explosives. Garden terracing to the south of the main house was excavated to create a pit. At one edge, a concrete bunker fitted with bomb-proof windows was constructed. This allowed staff to observe the experiments conducted within the pit.[55] By providing their scientists and engineers with testing facilities onsite, SOE created a flexible work environment. Trials could be undertaken at short notice without having to refer to the formal commissioning process.

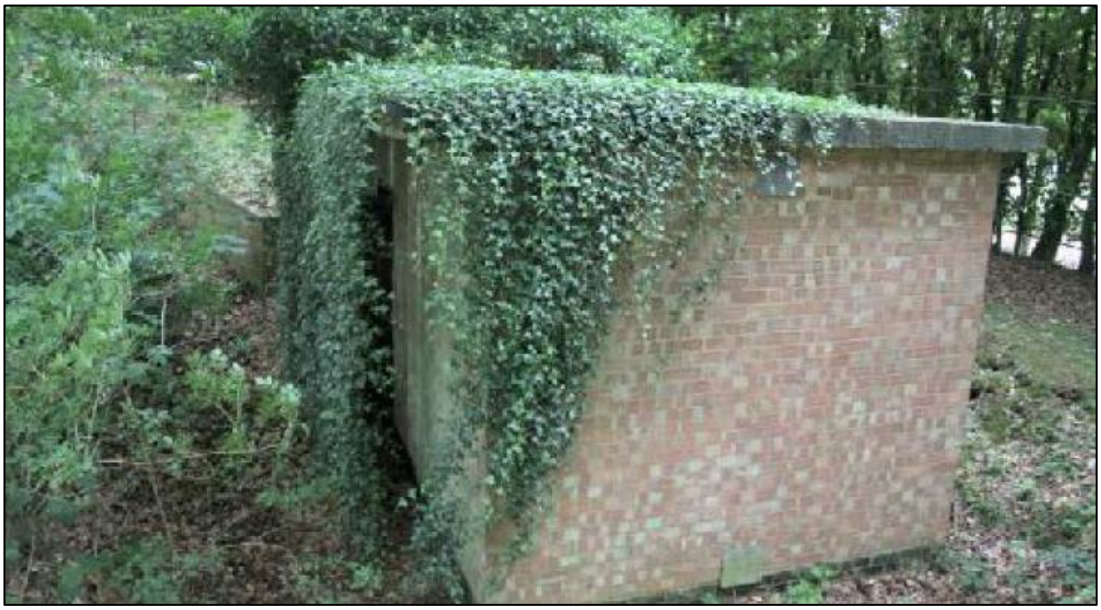

Figure 49: One of the magazines constructed within the grounds of The Frythe. These were constructed from Fletton bricks and roofed with reinforced concrete.[56]

[54] TNA HS 7/50 DHE/A/5032 Air Supply Research Problems under Investigation. Summary No. 6. Progress to February 18th, 1945 p. 2
[55] Fredric Boyce and Douglas Everett, *SOE* p. 16
[56] Helen Ashworth and David Hillelson, 'The Frythe, Digswell Hill, Welwyn, Herts: Archaeological and Historic Building Impact Assessment' (Unpublished Report, 2011)

In order to provide a safe environment in which the explosives could be stored, magazines were constructed in the grounds of The Frythe. These facilities were of single storey construction built of Fletton bricks and roofed with reinforced concrete (*Figure 49*).[57] Reached via a sloping concrete ramp, these structures were surrounded by a Fletton brick retaining wall.[58]

During 1944, there was a desire within SOE to increase the number of army and RAF 'other ranks' the organisation employed in undertaking research.[59] As accommodation at The Frythe was at full capacity, SOE began extensive improvements to the stable block. On 29 January 1944, fire gutted 75% of this new accommodation. It was, therefore, necessary to billet their staff in civilian properties.[60]

In March 1945, The Frythe was taken over by the Department of Miscellaneous Weapon Development (DMWD) of the Admiralty. This was to be for the duration of the war with Japan. Although DMWD took over the administration of the facility and made use of the workshops, they had no need for the chemical laboratories.[61] It was, therefore, arranged that SOE could continue utilising these spaces.[62]

Station VIIc, Allensor's Joinery Factory, Watford[63]

During 1943, SOE began expanding the departments within its Research and Development Section. As the spare accommodation at The Frythe could not cope with these increases, a decision was taken on 12 August by the Supplies Board to relocate the Radio Communication Division (RCD). This would provide the RCD with the workspace necessary to meet the anticipated increase in demands for equipment associated with Operation OVERLORD. It took the Property Section,

[57] Access to the site was not granted for this thesis. In 2011, two magazines are recorded as surviving.
[58] Helen Ashworth and David Hillelson, 'The Frythe …' p. 17. The style and construction technique of the magazines at The Frythe showed similarities with similar structures at Aston House.
[59] 'Other Ranks' are those soldiers who are not commissioned officers.
[60] TNA HS 7/46 Radio Communications Division pp. 30, 31
[61] These laboratories constituted one third of the facility.
[62] TNA ADM 277/1 Miscellaneous Weapon Development Department – Admiralty – 1940-1945: A History of the Department, A Survey of its Projects and A Key to its Technical Histories p. 9
[63] Station VIIa was located at the Bontex Knitting Mills, Wembley, and was involved in wireless production. Station Viib at the Yeast-Vite factory, Whippendell, and packed and despatched wireless equipment. Station Viid was at Kay's Garage, Birmingham, and manufactured wireless equipment.

however, until 4 October to identify a suitable premise for the department at Allensor's Joinery Works, Watford. Almost immediately, SOE embarked on a programme of alterations to this property. When work was completed in January 1944, the RCD relocated and all radio research ceased at The Frythe.[64]

Polish Military Wireless Research Unit (PMWR), Stanmore

The development of innovative and state-of-the-art equipment was not always kept in-house. One of the closest collaborations established by SOE was with the Polish military developing new wireless sets. At an Anglo-Polish meeting held at the Hotel Rubens on 29 April 1943,[65] Colonel Sulislawski, of the Polish Ministry of National Defence, presented a draft agreement which was to pave the way for Polish led wireless research.[66] Under this agreement, the Polish General Staff intended to transform the existing Military Wireless Research Unit (PMWR), based at Stanmore, into a self-reliant organisation with increased research and production capacity. As SOE had a vested interest in the PWMR, they declared their willingness to support this process.[67]

Following this agreement, it was arranged so that the PMWR Board of Directors would comprise of six Polish representatives, two SIS personnel, someone from the Telecommunications Research Establishment (TRE) and two SOE members of staff. The PMWR agreed that all material purchased had to be approved by SOE. It was also their responsibility, in conjunction with SIS, to ensure the facility was secure.[68]

[64] TNA HS 7/46 Radio Communication Division pp. 23, 24, 30, 31
[65] Hotel Rubins acted as the Polish Military headquarters during the Second World War.
[66] TNA HS 4/186 Minutes of Anglo/Polish Meeting held at Hotel Rubens on 29/4/43 p. 1
[67] TNA HS 4/186 An agreement between the Polish General Staff and S.O.E. concerning the Polish Military Wireless Research Unite Stanmore, (P.M.W.R.) p. 1
[68] TNA HS 4/186 Minutes of Anglo Polish Meeting held at the new factory, Wyckham House, Stanmore on Thursday, 25th March, 1943 at 1500 hours pp. 1, 2

Figure 50: Wykeham House, home to the Polish Military Wireless Research Unit.

Once the agreement had been signed, the Ministry of Works (MoW) began constructing 10,000 ft^2 (929.03m^2) of workshops in the grounds of Wykeham House, Gordon Avenue, Stanmore (*Figure 50*).[69] Part financed by SOE, the PMWR was provided with a yearly budget of £59,580 (*Table 8*). In parallel to the research undertaken at this facility, the staff also managed to manufacture 1,800 wireless sets between May 1943 and June 1945 (*Table 9*).

Expense	**Budget**
Wages	12,000
Material	31,600
Overhead	£8,530
Research	£7,450

Table 8: Planned budget of the year 1944 to 1945.[70]

[69] TNA HS 7/183 Appendix G Polish Military Wireless Research Unit p. 1
[70] TNA HS 4/187 Report on the Activities of PMWR for the Year 1943-1944 pp. 6-7

	British	Poles VI B	Poles Military	Total
Transmitting / Receiving Sets	75	1071	117	1263
Transmitters	35	11	2	48
Receivers	161	369	35	565

Table 9: Sets manufactured by the Polish Military Wireless Research Unit between 1 May 1943 and 8 June 1945.[71]

By 16 May 1945, the PMWR included a laboratory and general administrative offices, two workshops, which included mechanical and electrical assembly, inspection facilities and general stores. Within the mechanical workshop there were sufficient machine tools to enable the unit to manufacture small runs of radio sets. Whilst in the Electrical Assembly Workshop, there were all the instruments required to assembly and check the finished products. Between these two workshops, an output of 8,000 working hours was achieved monthly. The final checks were undertaken by the Inspection Section. They were equipped with all the necessary precision instruments required for this task. The responsibility of designing prototypes was given to the Laboratory and Research Section. This was staffed by scientific and technical officers who had all received a university education.[72] Instead of spreading their resources too thin, SOE's willingness to collaborate with the PMWR increased both organisations' capacity to develop innovative wireless technology.

Station VIII, Queen Mary's Reservoir, Staines

As has been previously mentioned, field trials are an essential element of research and development. Without testing equipment under realistic conditions, design flaws might be overlooked. The vast majority of the equipment developed by SOE could be trialled at their pre-existing facilities. With certain 'statement' projects, this was not always feasible. In 1941, the battleship TIRPITZ became a strategic target for the allied forces. To combat this threat, SOE constructed

[71] TNA HS 4/187 Sets manufactured by PMWR from 01/05/1945-08/06/1945
[72] TNA HS 7/183 Appendix G Polish Military Wireless Research Unit p. 1

engineering workshops at The Frythe to begin work on a one-man submarine. In March 1942, the organisation was allocated £3,000 for this project. Despite providing their engineers workspace, the organisation did not have the necessary facilities to conduct extensive trials on their 'Welman'. Eventually a large enough body of water was identified at Queen Mary's Reservoir, Staines, which would be ideal for conducting tests. Within SOE, this was to be known as Station VIII. Prior to the end of 1942, this facility had become operational and the first trials were held in October of that year.[73]

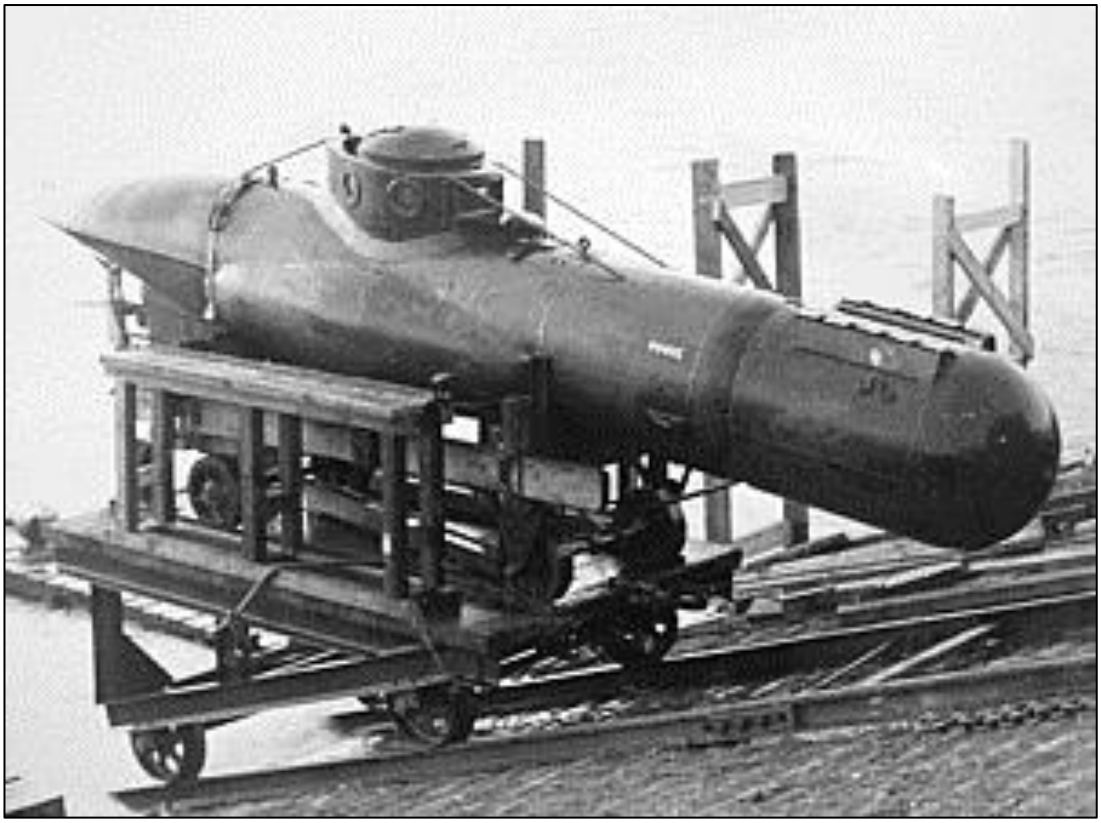

Figure 51: Specially constructed ramps and cradles were erected at Queen Mary's Reservoir to enable the miniature submarines to be lowered into the water.[74]

In order to successfully conduct the trials of the Welman, SOE had to construct certain shore facilities. To carefully lower the submarines into the reservoir, specially designed cradles were constructed on the shore (*Figure 51*). In order to make alterations onsite, SOE also planned on constructing a series of workshops. At this time, the organisation began questioning the security implications

[73] Fredric Boyce and Douglas Everett, *SOE* pp. 123, 126, 132
[74] IWM HU 56769

of using casual civilian contractors to undertake work on their behalf.[75] The expansion of Station VIII in late 1942 led SOE, 'with the knowledge and approval of the Ministry of Works and War Office, to form a mobile construction until (known as M.C.U.77) of R.E.s [Royal Engineers] under D/PROPS Section for the purpose of carrying out work of a particularly urgent or secret nature'.[76] The establishment of the MCU meant that SOE's future requirements for building work were kept in-house. This was to have a major impact on the nature of their facilities. No longer did the organisation have to use off-the-shelf designs.[77] By internalising the construction process, SOE also reduced the security risks of having to employ external contractors.

Station IXc, Great Western Hotel, Pembrokeshire

By July 1943, SOE required a facility at which open water trials could be conducted on their Welmans. The organisation's first choice was Fishguard in south-west Wales. Concerns were, however, raised by the Director of Local Defence. This harbour was used for searching maritime traffic between Ireland and the Iberian Peninsula. As both regions harboured pro-German sympathisers, the enemy would have taken an interest in the activities of this port. The Director of Naval Intelligence (DNI) also expressed concerns. As Fishguard was not located within a 'Protected Area', any activity by the water's edge would have been highly visible to observers. As an alternative, the Helford Estuary in Cornwall was suggested. This was dismissed by the head of Military Branch II, Naval Intelligence, as the number of cross-channel operations they conducted was to intensify. Increased military activity in the region would inevitably lead the enemy to take a greater interest.[78]

Eventually, the objections to Fishguard were dismissed and the second floor of the Great Western Hotel was allocated to SOE. This provided sufficient accommodation for 15 officers. The remaining personnel were lodged in the annexe

[75] TNA HS 7/15 Properties Section History p. 6
[76] Ibid p. 6
[77] The unique architecture designs developed by the MCU are a reoccurring theme identified by this thesis.
[78] Fredric Boyce and Douglas Everett, *SOE* pp. 142-3

of the hotel and 35 other ranks were billeted in nearby naval huts (*Figure 52*).[79] This facility was to be known as Station IXc within SOE.

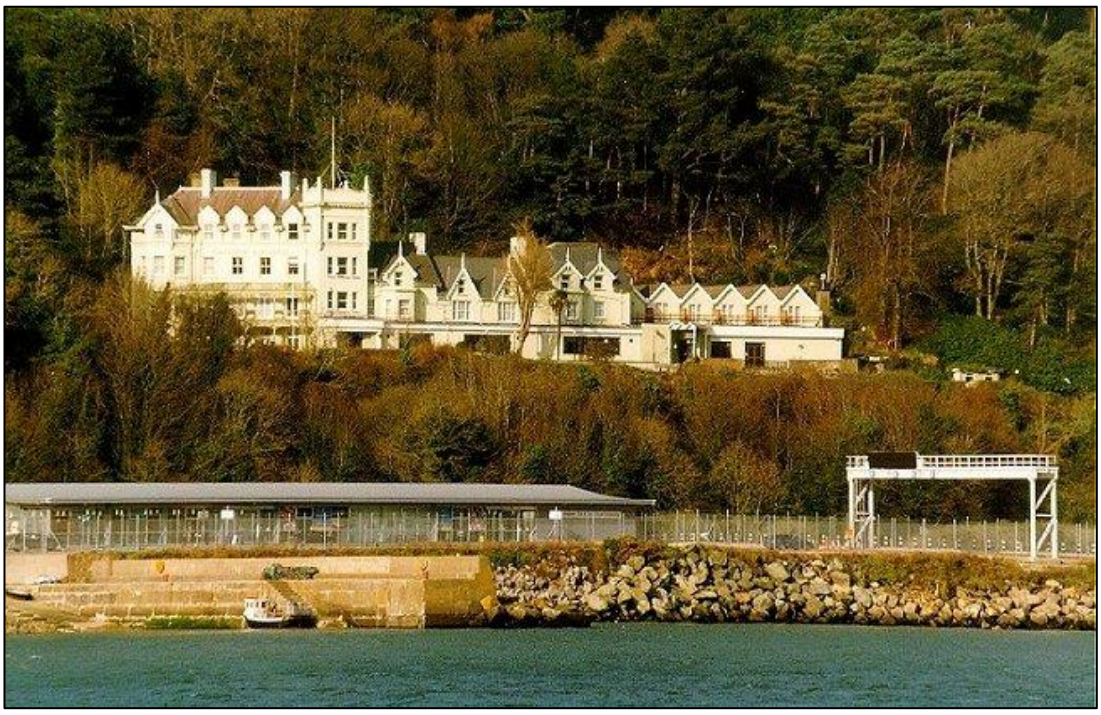

Figure 52: The Great Western Hotel, Fishguard, home to SOE's Station IXc.

Connected to the railway network, Fishguard possessed a large marshalling yard ideal for unloading submarines. As a working harbour, SOE also had access to the necessary facilities to move their submersibles to the waterfront (*Figure 53*). Fishguard Bay also provided a sheltered body of water in which the submarines could be calibrated prior to entering the Irish Sea (*Figure 54*). This facility was not, however, solely reserved for the trialling of submarines. Direction finders for ships as well as free-dropping supplies in conjunction with S-Phone homing sets were tested at this location.[80]

[79] Fredric Boyce and Douglas Everett, *SOE* pp. 142-3
[80] TNA HS 7/46 History of SOE Air Supply Research Section p. 34 and TNA HS 7/50 Radio Communication Division p. 12

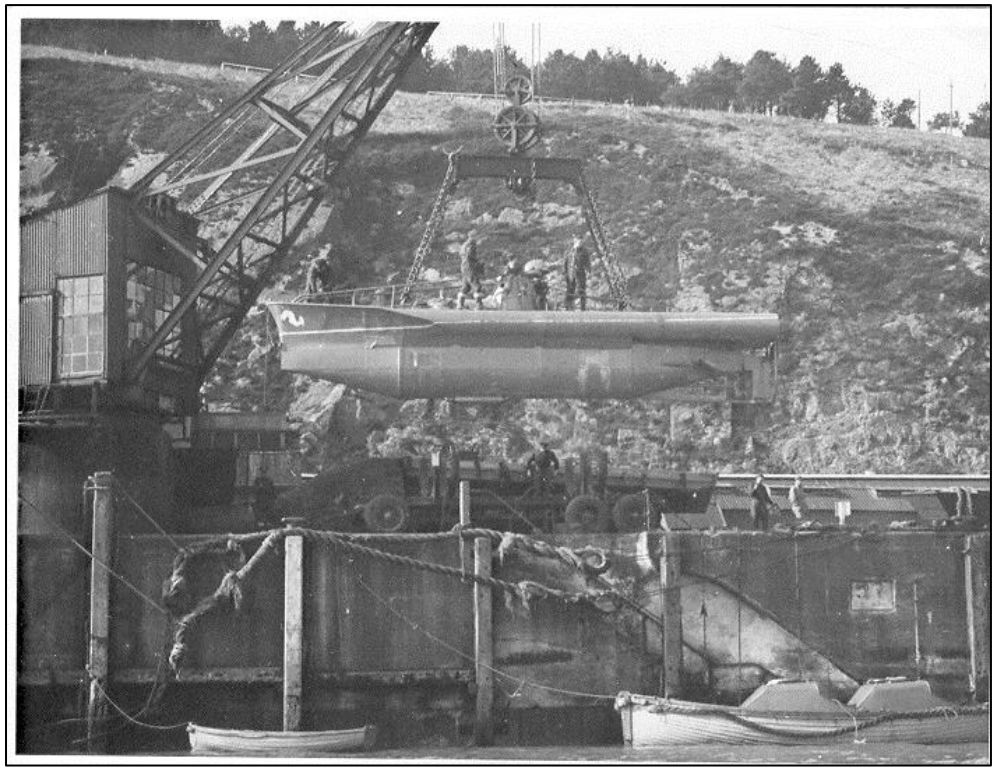

Figure 53: A Welfreighter being lifted into Fishguard Bay by cranes on the harbour.[81]

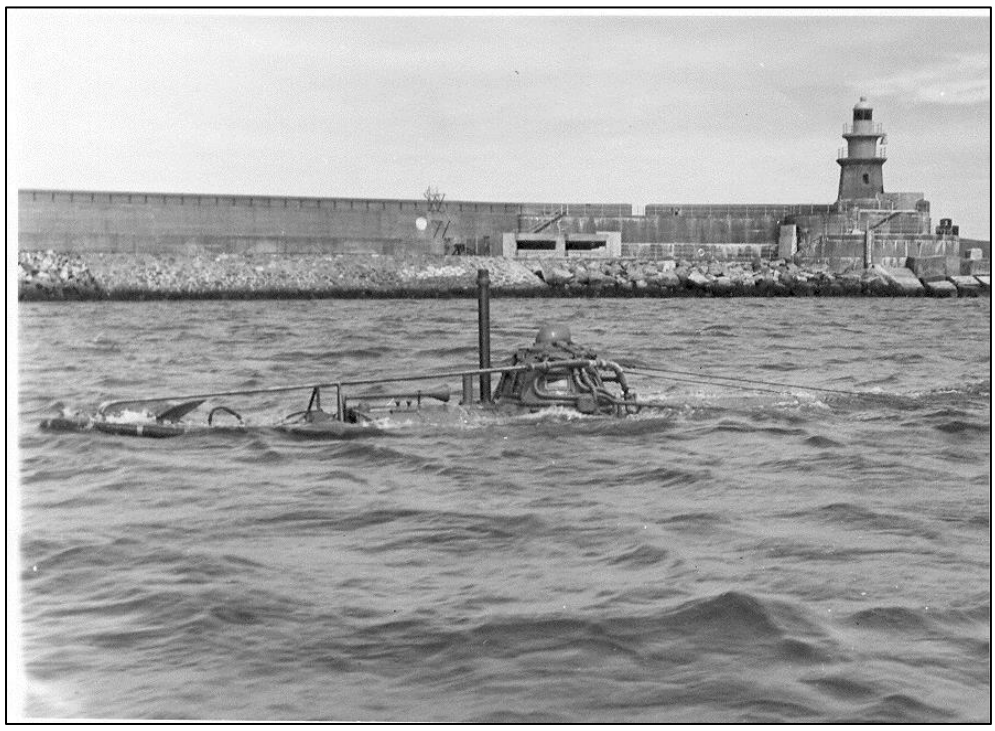

Figure 54: A 'Welfrighter' being tested in Fishguard Harbour. The activities of SOE in this small community would have been highly visible.[82]

[81] Private Collection

Miscellaneous Testing Facilities

Not all equipment developed by SOE required extensive facilities for field trials. Until August 1943, although the organisation had employed a Trials Officer within the Research Section, there were no strict requirements that all new devices had to be inspected. Following this date, a Trials Subsection was established within the Operational Research Section. All new equipment now had to pass a series of clearly defined tests.[83] As the operating environment could easily be replicated throughout the UK, there were few limitations on where these trials could be conducted. SOE, therefore, generally assessed new equipment at their pre-existing facilities.

Wireless equipment was often trialled between SOE's STSs and various other locations across the UK.[84] To assess their new 'Squirt' transmitters,[85] tests were conducted between Station 54, Fawley Court, and an undisclosed location in Scotland.[86] In early 1945, Sergeant Creaton, Royal Signals, was tasked with evaluating the English Midget Mains Receiver and the Polish Midget Mains Transceiver. Creaton was the ideal candidate as he had 'been responsible, for more than a year, for the technical training of all students at S.T.S. 52 and has, consequently, a wide knowledge of the ability of the student to handle radio equipment, and it was on the understanding that he would review …. from the students' point of view'.[87] For these tests, Creaton was sent to Thurso in the Scottish Highlands.[88]

When SOE wanted to trial air dropped containers, initially they utilised RAF Ringway.[89] Later on, 'all packing and dropping trials were to be … carried out by Station 61 [Gaynes Hall, Cambridgeshire], the Special Parachute Section, Henlow, or the operational squadrons [based at RAF Tempsford] … An alternative arrangement was, however, made with the Balloon Development Establishment,

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[82] Private Collection
[83] TNA HS 7/27 History of the trials Section, 1943-1944 p. 1
[84] TNA HS 8/336 System for Research, Demand and Supply of Radio Equipment required by SOE CD/644907/01/1944 p. 1
[85] A 'squirt' transmitter was a wireless set which could compress an average 15 minute message into a couple of seconds (Fredric Boyce and Douglas Everett, *SOE* p. 218).
[86] TNA HS 7/46 Radio Communication Division p. 21
[87] TNA HS 4/187 HJB/18/52/4054 12/04/1945
[88] Ibid
[89] TNA HS 4/173 Notes on visit to Ringway – 26th Oct. 1941 p. 1

Cardington, who placed a balloon at our disposal for drop-tests'.[90] For the majority of SOE's new equipment, the undertaking of user trials required little specialist infrastructure. As long as the field conditions could be replicated, an assessment could be made of their limitations.

SOE's Research and Development Infrastructure: A Case Study in Miniature Submarines

Prior to the Second World War, research and development into specialist equipment designed for clandestine warfare was only ever conducted in a limited capacity. In an age of appeasement, there was little political incentive within the UK to develop subversive weapons of war. When it became clear that the outbreak of hostilities was inevitable, this situation changed. During Section D's existence, the organisation developed some of the basic equipment of clandestine warfare. Following the formation of SOE, their scientists and engineers' could focus their endeavours on devices for specific operational requirements.

SOE's greatest investment in research and development infrastructure was related to their work on designing miniature submarines. In 1942, the strategic necessity of undermining the operational capabilities of the German Bismark-class battleship TIRPITZ came to a fore. Stationed deep within the Norwegian fjords, TIRPITZ posed a significant threat to the northern convoy routes to the Soviet Union.[91] As Churchill was of the opinion that the successful destruction of her would affect the global naval situation, the battleship became a target of the highest priority.[92] With such a high value placed on the TIRPITZ, all branches of the Armed Service immediately began investigating methods for her destruction. In an effort to gain favour within Whitehall, SOE also joined this race.[93]

[90] TNA HS 7/50 History of SOE Air Supply Research Section p. 13
[91] Patrick Beesly, *Very Special Intelligence: The Story of the Admiralty's Operational Intelligence Centre 1939-1945* (London, 2000) p. 117
[92] Edward Thomas, 'Norway's Role in British Wartime Intelligence' in: *Britain and Norway in the Second World War*, ed. Patrick Salmon (London, 1995) p. 124
[93] TNA HS 7/27 Appendix E Research and Development Organisation: Short History of Engineering Section Station IX since August, 1941 p. 2

Intelligence suggested that whilst at berth in Norway, the TIRPTIZ was protected by various layers of anti-torpedo netting (*Figure 55*).[94] Further defensive features included patrol vessels, searchlights, both on the shore and on-board, gun emplacements, smoke generators and maritime buffer zones.[95] SOE's operational procedure for attacking comparatively lightly guarded cargo ships from canoes was clearly not practical in this situation.

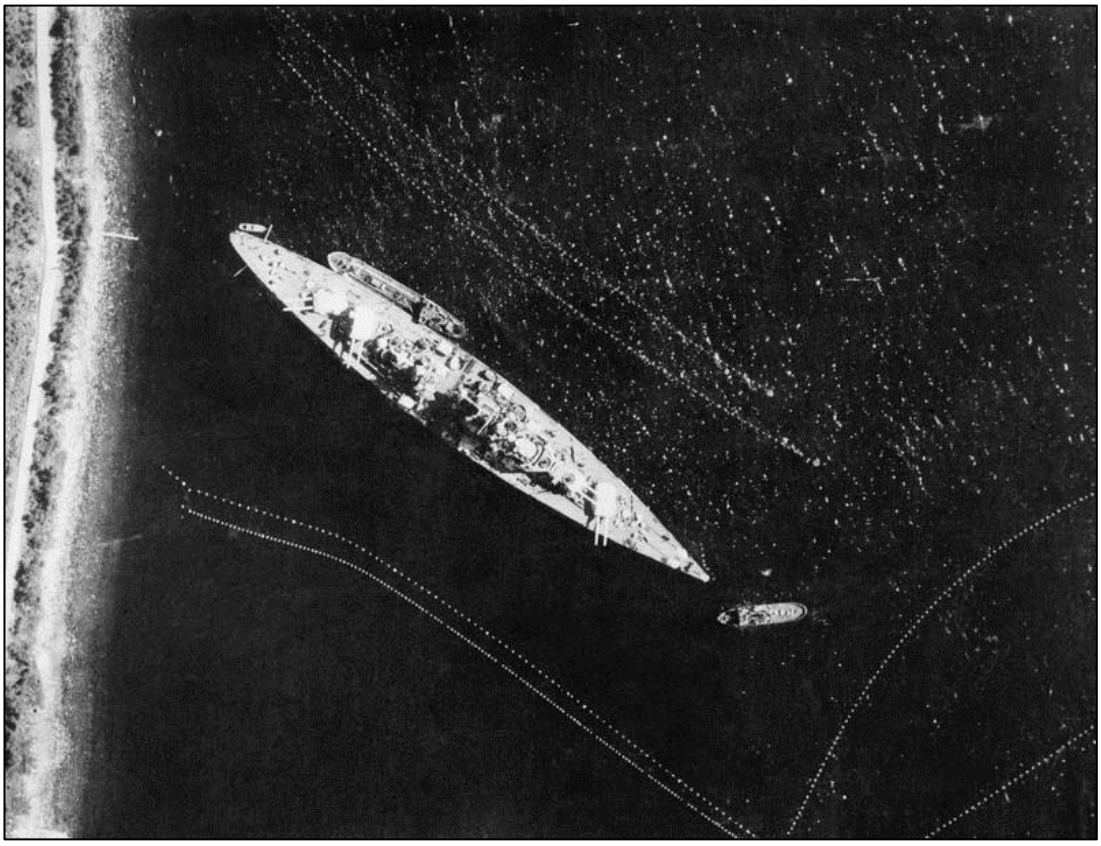

Figure 55: The security measures established round the TIRPITZ whilst berthed were extensive. These included patrol vessels, searchlights, both on the shore and on board, gun emplacements, smoke generators and maritime buffer zones.[96] *Attempting an attack run from a canoe would have been suicidal.*

The answer to this operational challenge, as determined by SOE, was the development of a one-man attack submarine.[97] This submersible was to become known as the 'Welman' and was the brainchild of the stubborn Colonel John

[94] Francis Hinsley, *British Intelligence in the Second World War: Its Influence on Strategy and Operations Vol.3 Part 1* (London, 1984) p. 529. The depth of these anti-torpedo nets were unknown.
[95] IWM A22634; IWM A19625; IWM C4122; IWM HU92979
[96] IWM C4122
[97] Fredric Boyce and Douglas Everett, *SOE* p. 123

Dolphin.[98] SOE's solutions was, however, not unique. Prior to the summer of 1940, the Army had begun work developing a miniature submarine. During July, control of the project transferred to the Admiralty. It took them a further two years of development before they placed their first order for 12 'X-Crafts'.[99] Despite the Admiralty's head start, SOE continued work on the Welman as the X-Craft had yet proved itself in combat.

Within SOE, support for the development of the Welman continued despite internal correspondence indicating a growing awareness of its operational shortcomings.[100] It became apparent that during an attack run, there was simply far too much for a single person to effectively accomplish. Furthermore, by being alone, the operator was denied the moral support of another crew member.[101] Despite these flaws, SOE continued investing heavily in resources and infrastructure necessary for the development of the Welman. This reflected an internal desire to provide the capabilities of achieving a major strategic objective. The destruction of enemy battleships was one of the tasks SOE had no proven operational procedure. It was possible that if the organisation could remove the threat of the TIRPITZ, their position within Whitehall might have become unassailable.

Whilst work was ongoing developing the Welman, SOE began designing a submersible capable of delivering supplies to a hostile coastline. In 1942, the organisation lost operational control of their maritime link to occupied France. Despite initial protests, SOE never attempted to re-establish these networks. This was because operational experience had demonstrated the limitations of supplying the resistance by sea. The responsibility for shipping agents and supplies was transferred to a reluctant RAF.[102] SOE, therefore, lost its independence and had to rely on a third party for their transportation arrangements.

Although there were clear operational advantages of using aircraft, the development of the 'Welfreighter' represented a desire to regain operational freedom. SOE's designed a submarine which had a surface range of 400 miles

[98] Paul Kemp, *Underwater Warriors* (London, 1999) p. 160. Before the war, Dolphin had worked at the Sheepbridge Coal and Iron Company before establishing himself as a self-employed engineering consultant.
[99] Paul Kemp, *Underwater Warriors* pp. 152, 153. As the Admiralty intended to employ the X-Craft against TIRPITZ in March 1943, the orders placed with Vickers were a priority
[100] TNA HS 8/798 Report on Capabilities of Welman Craft pp. 1-4
[101] Paul Kemp, *Underwater Warriors* p. 160
[102] This is discussed in details in Chapter VI: Transportation

travelling at 7 knots and 20 miles submerged at 3 knots. The vessel could accommodate two passengers and carry 1,000lbs[103] (453.6kg) of freight.[104] There were, however, concerns raised within SOE over whether a Welfreighter has 'any advantages … over an M.G.B. [Motor Gun Boat] with dinghy'.[105]

Despite the operational limitations of all of SOE's attempts at designing miniature submarines, their determination to continue pursuing these avenues reflects a desire to expand their maritime capabilities. The development of these submersibles also established a close working relationship with the Admiralty.[106] If the organisation had perfected the designs, they would have also been in a position to increase the operational capabilities of the Royal Navy.

Although certain 'statement' projects received heavy investment, the facilities and expertise necessary for their development could be utilised by other research clusters. By providing their scientists and engineers with specialist infrastructure and flexible trialling facilities, SOE created a milieu in which they had the freedom to innovate and speculate. Heavy investment in research and development by the organisation reflects the value they placed on state-of-the-art equipment specifically designed for clandestine warfare. Not only would the provision of sub-standard supplies to the resistance undermine SOE's authority, it might also compromise active operations. As the organisation inherited a number of 'basic' items from their predecessors, they could invest more time and resources into devices designed for specific operational requirements. By the end of the war, SOE had accumulated an extensive catalogue of clandestine equipment.

SOE's Material Culture

The nature of SOE's research and development facilities meant that they are often indistinguishable from other similar sites. Workshops, laboratories and testing facilities are ubiquitous as they require standardised equipment to operate

[103] This was only equivalent to three fully loaded Type C containers, a fraction of the stores which could be transported by a fully loaded Halifax.
[104] TNA HS 8/801 ADL/542 Welfreighter Specifications 29/12/1942. The load it could carry was equivalent to three fully loaded Type C containers, a fraction of the stores which could be transported by a Halifax bomber.
[105] TNA HS 8/799 Naval Section Staff Minute Sheet Subject: 2-man Welman 10/08/1943
[106] TNA HS 8/799 2-man Welman 10/08/1943

effectively. What was unique to the organisation was the new form of military artefacts they created. One of the greatest considerations SOE's scientists and engineers had to contemplate was the size of the equipment they were designing. It was essential that all supplies sent to the resistance were as compact as possible. This had the duel benefit of increasing the number of stores which could be transported during each resupply mission, whilst also allowing the resistance to easily conceal the items. Unlike the military who were mainly concerned with efficiency and the destructive nature of their equipment, SOE had to combine these with effectively shrinking their size.

Another consideration which had to be taken into account was the ability of these items to be camouflaged.[107] The new equipment had to incorporate a degree of flexibility which enabled them to be disguised as commonplace items. This duality of SOE's material cultural meant outwardly the equipment appeared as everyday ubiquitous objects, whilst in fact they were of a highly sophisticated nature. To be truly effective, they had to function as both.

Archaeological Remains

In March 1945, SOE's main Research and Development facility at The Frythe was taken over by the Admiralty's DMWD.[108] When this organisation vacated the property it was then operated by Unilever followed by GlaxSmithKline. Under these two companies, the facilities at The Frythe underwent dramatic alterations (*Figure 56*). The extensive remodelling of the site has potentially impacted the survival of traces of SOE's Station XII. In 2011, two of the organisation's magazines were still extant within the grounds of The Frythe.[109] By 2015, the site was in the possession of a company planning on developing the site into a housing estate.[110]

[107] The facilities associated with SOE's Camouflage Section are discussed in detail in Chapter V: Supply.
[108] TNA ADM 277/1 Miscellaneous Weapon Development Department – Admiralty – 1940-1945: A History of the Department, A Survey of its Projects and A Key to its Technical Histories p. 9
[109] Helen Ashworth and David Hillelson, 'The Frythe …'
[110] See Appendix D: Miscellaneous Data for a list of SOE's properties which have the potential for surviving archaeology.

Figure 56: Google Earth image of The Frythe. The later redevelopment of the site has potentially impacted the survival of remains associated with SOE's Station XII.

There is, however, the possibility of surviving infrastructure associated with SOE's trials of maritime equipment at both Queen Mary Reservoir and Fishguard. Traces of the organisation may survive as ramps, slipways and workshops: graffiti and arborglyphs may also be present.

This chapter has demonstrated the value SOE placed on developing innovative equipment intended for clandestine warfare. By investing in workshops and laboratories, the organisation gained the capacity to design a wide range of military hardware. The next chapter will examine the infrastructure and facilities developed by SOE to manufacture and prepare these items ready for despatch to the field.

CHAPTER V
Supply

Once new equipment had passed SOE's user and field trials, it was essential that the organisation could manufacture and prepare these items for delivery to the field. Without an efficient and reliable supply chain, the organisation could not have armed resistance groups.[1] Certain 'standard' equipment could be obtained through Army, Royal Navy or RAF channels. As SOE's role was new and unique, these supply networks could not, however, always provide the necessary items. In these circumstances, the designs developed by their Research and Development Section would either be manufactured in-house or subcontracted to an external organisation. These supplies were then stock piled at various facilities across the UK in advance of requests for equipment from the field.

To ensure the items were delivered in a useable condition, SOE invested in developing containers in which stores could be safely transported to mainland Europe. It was also necessary for the organisation to investigate methods of packing items to ensure they were not damaged in transit. As the war progressed, SOE devised various standardised content lists. This allowed the organisation to shorten the time between a request being received and stores being delivered.

Although supply chains are a relatively dry subject seemingly far removed from operations, this aspect of SOE represented a considerable achievement that says much about the ability of the organisation as a whole. It will be demonstrated that during 1942, SOE's supply chain underwent a substantial expansion and a geographical realignment. Without the supply infrastructure the organisation developed in the UK, the European Resistance would have been unable to function effectively.

[1] In this thesis, SOE's supply chain relates only those facilities which were under the direct control of the organisation for the manufacture, storage and packing of material required by the resistance. In support of this infrastructure were a wide range of private organisations supplying primary material, companies manufacturing equipment on behalf of SOE and businesses preparing them for despatch. As these facilities were not directly under the control of SOE, they will not be included in this assessment.

SOE's Supply Chain

Before supplies could be delivered to the resistance in the field, they had had to pass through an extensive and complex infrastructure established by SOE in the UK (*Figure 57*). Despite the mundane nature of logistics, this was an essential element of SOE which underpinned the organisation's operational capabilities. The development of their supply chain was reflective of SOE's increasing competence as the war progressed.

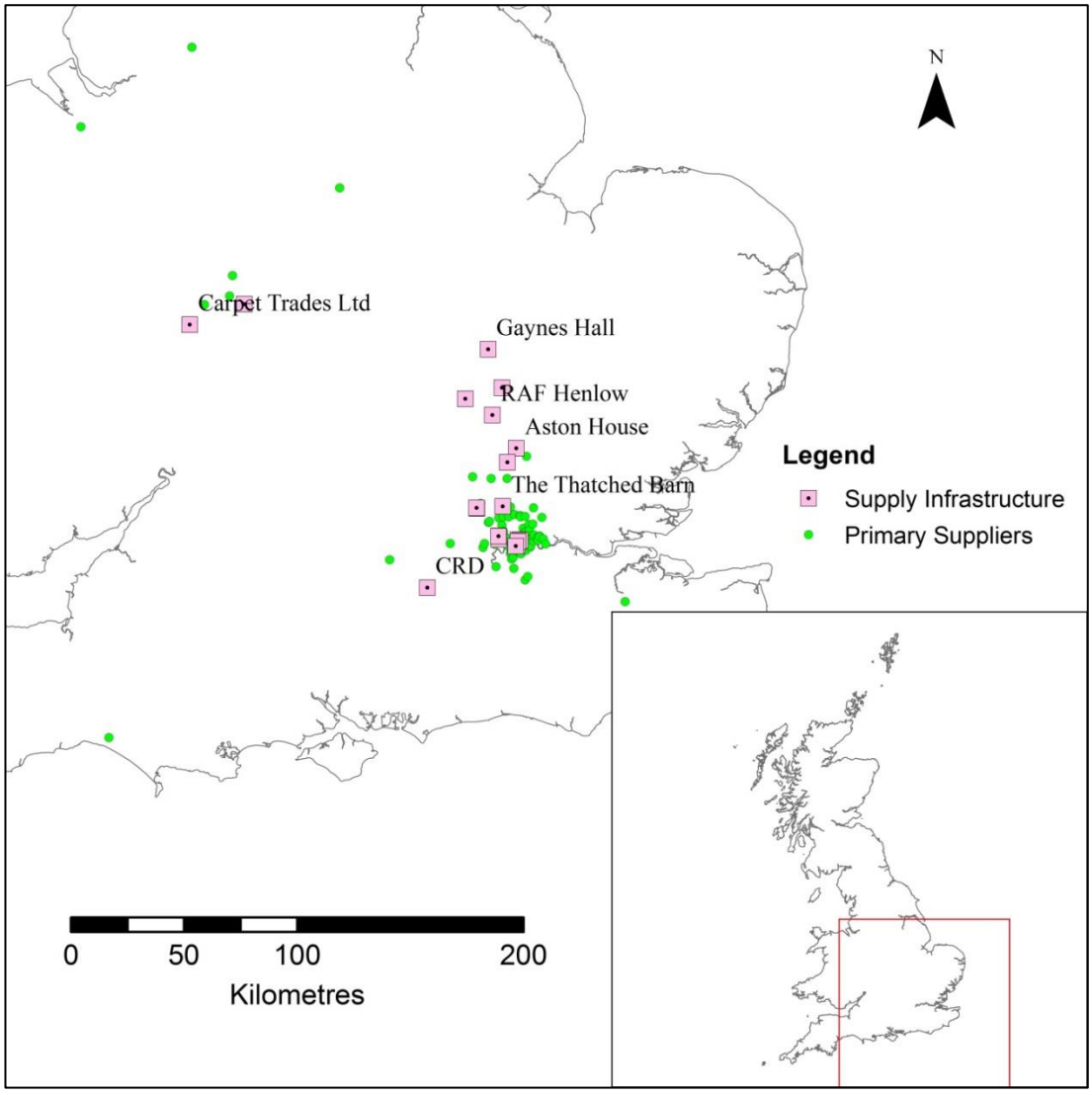

Figure 57: Distribution of SOE's supply facilities within the UK. The greatest influence on the network was the Great North Road and the Great Northern Railway. These ran between London and Edinburgh passing The Thatched Barn and Gaynes Hall on route.

On the formation of SOE in July 1940, the organisation inherited a virtually non-existent supply infrastructure. Supporting active resistance networks with equipment was unprecedented before the war. Until April 1940, although the combatants were at war, neither side launched a major land offensive. During this phase, the resistance had not yet formed in the majority of Europe. Those networks which had developed in countries overrun by Germany were often of a fragmented and embryonic form. These groups, such as those established in Poland, were also located beyond the range of contemporary aircraft. It was, therefore, neither feasible nor desirable to supply them with equipment.

The first stage in a successful supply chain is always the primary producers. Scattered throughout the UK, the Empire and the United States, SOE was dependent on private businesses to provide them with raw material and, occasionally, manufactured equipment. Without their support, it 'would have been impossible [for the organisation] to carry on'.[2] It was common for SOE to issue contracts to those companies their staff had relations with prior to the war.[3] These personal acquaintances ensured the quality of their work could be guaranteed. Prior relationships also meant the organisations asked fewer questions with regard to their contracts. Throughout the war, SOE found that their suppliers undertook the work with 'great enthusiasm'.[4]

It was inevitable that not all equipment required by their agents could be subcontracted to private companies to produce. One of the most secretive aspects of the manufacturing process was camouflaging the equipment so that it might 'pass' in occupied Europe. In November 1941, SOE employed the services of a camouflage expert. As it rapidly became apparent that advice alone was insufficient, a small facility was established in the grounds of The Frythe in January 1942. The following month, the expanding department took over larger workshops in the Victoria and Albert Museum, Kensington.[5] It was their responsibility to 'produce concealment devices for the transportation and use of arms, explosives, operational money, codes, documents, radio transmitters and receivers, together with special stores for the equipment of Agents in the Field'.[6] In June 1942, the Camouflage Section once more

[2] TNA HS 7/46 History SOE False Document Section p. 3
[3] TNA HS 7/46 Handbook SOE False Document Section p. 3
[4] Ibid p. 3
[5] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 p. 1
[6] Ibid p. 1

relocated. This time they moved to a larger property which provided them sufficient capacity to expand to meet increasing operational requirements. Situated on the Barnett bypass, the Thatched Barn became known as Station XV and dealt with all large scale production (*Figure 58*). This left the staff at the Victoria and Albert Museum responsible for producing prototypes and providing personal contact with agents.[7]

Figure 58: The Thatched Barn, located on the Barnett bypass. In June 1942, SOE relocated their Camouflage Section from the Victoria and Albert Museum to this new accommodation.

Once equipment had been camouflaged, it was necessary to store it prior to being despatched to the field. Prior to SOE's formation, the facilities operated by her predecessors were characteristically multifunctional. Section D constructed a small magazine for the storage of explosives and incendiaries at Bletchley Park, Station X. This site was also being used by the Government Code and Cypher School (GCCS). Due to the influx of their personnel following the outbreak of war, Section D's experimental section took up permanent residence at Aston House, Hertfordshire, in

[7] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 p. 3

November 1939.[8] The allocation of properties to the Secret Services was normally the responsibility of other organisations. If the Ministry of Works had no vacant properties which were suitable, SOE 'would approach the W.O. [War Office] to ascertain whether they had any … houses which they could transfer to the Ministry of Works for I.S.R.B. [Inter Services Research Bureau, cover name for SOE], or failing this, whether the W.O. could release any suitable earmarked houses in favour of the Ministry of Works'.[9] Although the allocation of Aston House to Section D might have been out of the organisation's hands, in June 1941, it became SOE's primary storage facility.[10]

SOE's storage capacity increased further in July 1942 when the organisation managed to arrange for a significant part of the 84 Command Ammunition Depot, Sandy, Bedfordshire, to be transferred over to their control.[11] This facility was ideally suited for SOE's requirements as it was located on the Great Northern Axis. The axis comprised of the Great North Road, which was one of Britain's principal highways, and the Great Northern Railway,[12] which offered a high-speed train service between London and Edinburgh.[13] As the war progressed, this pre-existing logistics network was to play an increasingly important role in SOE's supply chain.

In close proximity to Aston House was The Frythe. As discussed in the previous chapter, this property, which SOE also inherited from Section D, was to become their key centre for research and development. In December 1940, whilst the facility still only housed the wireless research section, plans were afoot to construct an armoury in the grounds. Pending completion of this work, the North Road Garage, Welwyn, was requisitioned to act as a temporary solution. By February 1941, this facility had developed the capability to be able to send a single consignment of 20 tons of arms to Norway.[14]

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[8] TNA HS 7/27 History of the Research and Development Section of SOE pp. 3-4
[9] TNA HS 8/337 Draft of Suggested Reply to Mr George Hick's Letter to the Minister dated 28th August 1941 p. 1
[10] TNA HS 7/27 History of the Research and Development Section of S.O.E. p. 7
[11] Des Turner, *Aston House Station 12: SOE's Secret Centre* (Stroud, 2006) p. 204
[12] On the declaration of war, Britain's railways were generally in an excellent condition. In the preceding decade, £315,500,000 had been spent modernising the network. By 1942, 19,675 locomotives were operating on the British railway (Alan Earnshaw, *Britain's Railway at War 1939-1945* (Penryn, 1989) pp. 2, 94, 112). This provided SOE an extensive logistics network which could be utilised for their own purposes.
[13] Jon Nicholson, *A1: Portrait of a Road* (London, 2000) p. 5, Norman Webster, *The Great North Road* (Bath, 1974) pp. 8, 10, Michael Bonavia, *The Four Great Railways* (North Pomfret, 1980) p. 55, Oswald Nock, *The Great Northern Railway* (Shepperton, 1974) pp. 4, 11
[14] Fredrick Boyce and Douglas Everett, *SOE: The Scientific Secrets* (Stroud, 2009) pp. 19, 20

Despite this capacity, the armoury at the North Road Garage was deemed insufficient by SOE. In July 1941, a move to a new property by the Small Arms Section was planned. SOE's new armoury was to be located at Bride Hall, Hertfordshire (*Figure 59*). As there was a perceived threat from the 'Fifth Column', 'secrecy was of paramount importance, and with the house situated "miles from anywhere", it made the perfect secret service "hide-out"'.[15]

Figure 59: Bride Hall, Station VI, home to SOE's Small Arms Section. This facility was ideal for the organisation as it was isolated and had extensive storage capacity in the two medieval barns.

With the development of officially sanctioned clandestine warfare, a disparity in the requirements of supplying frontline troops and supporting networks operating in enemy territory arose. With the resistance, there were no rear echelons to directly supply them. All equipment, therefore, had to be transported beyond the frontline by air or sea.[16] Before the supplies could be 'shipped' to mainland Europe, they would have to be packed into containers to protect them during transit.

[15] TNA HS 7/27 Bride Hall
[16] See p. 157.

During 1940, SOE acquired space within RAF Henlow which they utilised for the modification and packing of parachutes and the filling of packages.[17] Although this airfield was one of Britain's busiest, it was home to the RAF's Special Parachute Section.[18] As the art of parachuting was still in its infancy, by establishing a facility at RAF Henlow, SOE ensured they had access to experts in this specialist field. It was fortuitous for SOE that this airfield was also located on the 'Great Northern Axis'.

Figure 60: Richmond Terrace, London. This road is in the centre of Whitehall and surrounded by government buildings. The establishment of a parachute packing and storing facility within this structure by SOE would have restricted the organisation's capacity to meet increasing operational demands.

On 5 June 1941, representatives of SOE and the RAF met to discuss coordinating the two organisation's future parachute requirements. It was decided that it would be advantageous to relocate the storing and packing of 'these special

[17] TNA HS 7/50 History of the Packing Stations within SOE p. 3
[18] TNA HS 7/50 Services, Supplies and Research 12/11/43

parachutes in London. At present these are stored and maintained at Henlow, and a good deal of time and petrol is wasted through representatives of both organisations having to travel to and from Henlow to collect the appropriate parachutes … [It was proposed that] Room 1 and 2 at No. 1 Richmond Terrace or Room 101 at No. 4, Richmond Terrace would be well suited for this purpose' (*Figure 60*).[19] Located at the heart of government, Richmond Terrace was highly unsuitable for the establishment of a parachute and packing facility. The limited capacity of the rooms would have restricted the organisation's ability to expand to meet the growing demands for supplies from the field. This move never materialised and SOE maintained a presence at RAF Henlow for the remainder of the war.

Figure 61: The stable block of Audley End House. This was used by SOE from 1941 until 1942 when the Packing Section relocated to Gaynes Hall.[20]

On 2 October 1941, four months after this meeting, SOE established their first station dedicated to packing supplies for Europe. This facility was housed in the

[19] TNA AIR 2/5203 Storing and maintenance of parachutes 05/06/41
[20] Author 2013

stable block of Audley End House, Essex (*Figure 61*). At the time, this property was also being used as a training facility for Polish agents. The finite space available, combined with the dual function of the site, meant that almost immediately the building proved inadequate for SOE's expanding operational requirements.[21] It became apparent that a new property would have to be acquired for the packing section.

Six months after SOE established their first packing facility at Audley End, the group relocated to a property purposely assigned to their section.[22] The allocation of Gaynes Hall, Huntingdonshire, represented an important development in SOE's supply chain (*Figure 62*). Here was a facility which offered the organisation ample capacity to expand to meet increasing operational requirements. Situated on the Great Northern Axis, the move of the packing section to Gaynes Hall consolidated the importance of this pre-existing transportation network to SOE's supply chain.

Figure 62: Gaynes Hall, Huntingdonshire. In 1942, SOE relocated their Packing Section from the stable block at Audley End to this property. This new facility offered SOE ample space to expand their capacity to meet changing operational requirements.

[21] TNA HS 7/50 History of the Packing Stations within SOE p. 1
[22] Ibid p. 1

In November 1943, SOE realised that Gaynes Hall did not have sufficient capacity to develop a container reserve for the upcoming invasion of mainland Europe.[23] The organisation, therefore, sent one of their most experienced packers to 'Messrs. Carpet trades Ltd. Of Kidderminster … His duty was to instruct the employees, nearly all women, in the packing of Sten, Bren and Rifle containers (these three types being chosen owning to the great demand and unskilled labour could perform the task of packing)'.[24] The first order placed by SOE with this company was for 4,000 containers. This was to be eventually increased to 18,500.[25] As Messrs. Carpet Trades was producing a stockpile of containers, its geographical isolation from the rest of SOE's supply chain is understandable: there was no immediate urgency for the completion of the order.

In 1942, a reluctant RAF caved in under increasing political pressure and allocated an airfield to the Secret Services.[26] By 11 April 1942, both Special Duty squadrons had relocated to RAF Tempsford.[27] Although it was the RAF's decision to allocate this 'substandard' airfield to 'special duties', it was fortuitous that it was located on the Great Northern Axis. The dedication of RAF Tempsford to support the Secret Services cemented the importance of this pre-existing logistics network to SOE's supply chain. Through a combination of conscious planning and serendipity, the pre-existing Great Northern Axis became a central feature to the organisation's logistics. This provided SOE an efficient transportation system to move personnel and equipment rapidly around the country.

By July 1944, any request submitted to SOE's Section E (Supplies) was expected to be delivered within days.[28] The organisation had developed a reputation by then whereby 'a telephone call from M.O.1.(S.P.) [one of SOE's cover names] meant a store was required in the quickest possible time'.[29] On receiving an order, the department would enlist the assistance of the War Office transport branch and arrange for the delivery to be made by road. It was common for SOE to organise the movement of thousands of tons of stores through the War Office.[30] On one occasion

[23] TNA HS 7/50 History of the Packing Stations within SOE p. 3
[24] Ibid p. 3
[25] Ibid p. 3
[26] TNA AIR 20/2901 Freeman to Harris 23/03/1942
[27] RAF Tempsford will be discussed in greater detail in *Chapter VI: Transportation*.
[28] TNA HS 7/46 Appendix C Army Store p. 6
[29] Ibid p. 5
[30] Ibid p. 6

when ‘1,600 tons of ammunition were urgently required, two special ammunition trains were laid on’.[31] It was because SOE utilised a pre- transportation network that movement of supplies of this magnitude was feasible.

The exploitation of the rail network could, however, be problematic. The organisation quickly learnt that supplies despatched ‘by passenger train to a London terminus was not a good idea as so many parcels and cases arrived at the same time that it took Railway staff a considerable time to locate packages intended for us’.[32]

SOE’s UK based supply chain was not necessarily always intended to directly support the European Resistance. To function effectively, the organisation also required supplies. In order to support their UK based facilities, SOE established a storage facility in the Knoll School, Camberley, Surrey.[33] Known as the Camberley Reception Depot (CRD), it was the responsibility of this facility to store and distribute equipment requested by SOE’s departments based within the UK.[34] As the organisation was spread across the width and breadth of the country, Camberley was ideally located on a major railway line. From there, equipment could easily be shipped to their intended destination.

The Nature of SOE’s Supply Chain

Central to an efficient supply chain are professional depots and reliable manpower. No matter how proficient a logistics network appeared, it could not function without capably run facilities. SOE’s supply chain consisted of primary supplies through storage deports to their packing stations. Although these facilities commonly had multiple functions, the nature of these sites were not necessarily unique. The real test of SOE’s efficiency was their ability to manufacture, pack and deliver equipment requested from the field to RAF Tempsford ready for transit.

[31] TNA HS 7/46 Appendix C Army Store p. 6
[32] Ibid p. 5
[33] TNA HS 6/960 Provision of Personnel for Special Training Schools HOR/A/117 11/02/1943
[34] TNA HS 7/51 Chapter II: The Headquarters of the Training Section p. 8 and HS 7/46 Appendix C Army Store p. 5

SOE's Manufacturing Facilities

Although the unique role of SOE's agents meant a certain degree of specialised equipment was required, the organisation was dependent on the War Office to supply standardised items. The head of the organisation, CD, arranged with the armed services that any requests for supplies originating from within SOE would be met with no questions. It was also agreed that all costs would be written off. To ensure supplies would be delivered on time, it was necessary for the heads of departments to provide an indication of upcoming operations to allow for the prioritisation of equipment allocation.[35]

Figure 63: Aston House, Hertfordshire, home to SOE's main supply facility. Within the grounds, workshops enabled the small scale production of equipment.

The unique role of SOE's agents inevitably meant a certain degree of specialised equipment was required. As these could not be obtained through pre-existing military channels, SOE had to design them from scratch.[36] Once new designs had been approved, it was the responsibility of the organisation's Section E to arrange for their production. In order to bulk manufacture these items, SOE often

[35] TNA HS 7/46 Appendix A p. 1
[36] See p. 88

approached private companies. As the request came from the War Office, producers were often willing to cooperate. On account of security precautions, SOE had to take great care when requesting items which were out of the ordinary.[37] Occasionally, companies were reluctant to 'supply any goods, even to the War Office and when operational necessity was hinted at, unless they still bore their trade name. In course of time, however, these difficulties were gradually overcome as the firms with which we dealt came to know us better'.[38]

Figure 64: Bontex Knitting Mills, Wembley, Station VIIa. SOE took over this factory for the purpose of manufacturing wireless equipment.[39]

For small scale batch production and the manufacturing of prototypes, SOE made facilities available at The Frythe and Aston House (*Figure 63*). As this was neither of their primary functions, the capacity of these facilities to produce equipment was limited. To facilitate the manufacturing process, SOE constructed machine and carpenters' shops in the grounds of Aston House. Within the estate, a miniature filling factory was also erected. In this structure, SOE could assemble and pack high explosive demolition charges in accordance with contemporary magazine

[37] TNA HS 7/46 Appendix A p. 1
[38] Ibid p. 1
[39] IWM HU56759

regulations.[40] In preparation for Operation OVERLORD, SOE managed to arrange for part of the Royal Ordnance Factory (ROF) Elstow, Bedfordshire, to be transferred over to their control.[41] This increased the organisation's capacity to produce specialist charges in anticipation of a more active resistance following the invasion.

The production of certain state-of-the-art equipment was, inevitably, kept in-house. In June 1942, SOE's Wireless Production Unit relocated their manufacturing process from The Frythe to the Bontex Knitting Mills, Wembley (*Figure 64*).[42] As the organisation was developing innovative wireless sets, the security of these designs was paramount. By keeping the manufacturing process in-house, SOE ensured that their equipment was not compromised. Production of these wireless sets was not always for internal consumption. Over the course of the war, the organisation also received hundreds of thousands of pounds worth of contracts placed by the Ministry of Supply (*Figure 65*).

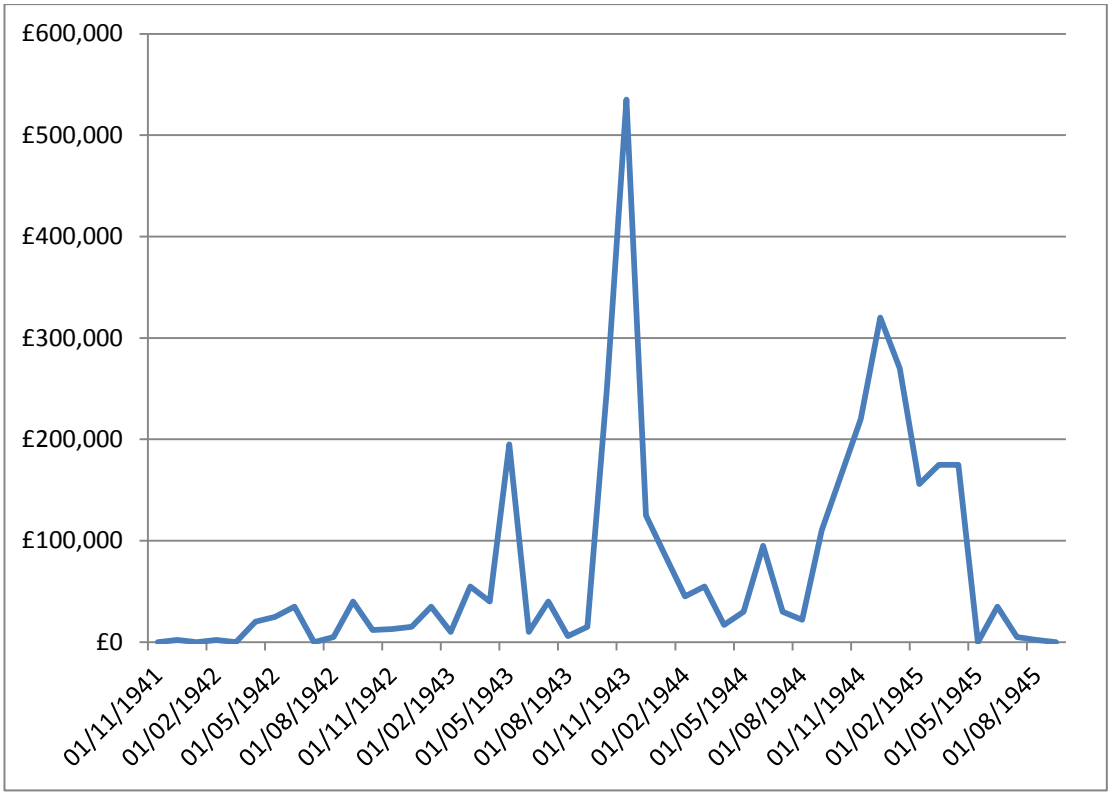

Figure 65: Graph showing the value of Ministry of Supply contracts placed with Station VIIb.[43]

[40] TNA HS 7/27 History of the Research and Development Section of SOE p. 5
[41] Fredrick Boyce and Douglas Everett, *SOE* pp. 215, 233
[42] Ibid p. 215
[43] TNA HS 7/46

It was also not practical for SOE to subcontract the production of forged documentation. Although fighting a 'total war', acknowledgment of certain clandestine activities could have potential political implications. It was, therefore, necessary for SOE to establish an in-house forgery department. Accommodation for this section was found within Station XIV located at Briggins, Essex (*Figure 66*). Initially, the forgers shared the premises with STS38. This had been established to prepare Polish agents for life within hostile territory. By 1 April 1942, the students from Briggens had relocated to Audley End. This move allowed the printing works to substantially expand. At its peak, the Forgery Section employed 50 members of staff, the majority of whom were ex-convicts. Over its operational life, this department produced in excess of 275,000 documents.[44]

Figure 66: Briggins, Essex, Station XIV. Before being completely taken over by the Forgery Section, this facility was also home to STS38 which was a training establishment of the Polish Section.

As it was not practical to internalise their entire manufacturing process, SOE awarded the majority of their contracts for equipment to private companies. It was not uncommon during the war for the armed services to utilise business in support of

[44] Fredrick Boyce and Douglas Everett, *SOE* pp. 97-8

the war effort. The employment of experienced workforces and pre-existing manufacturing infrastructure was an efficient method of producing vital equipment. On 28 August 1942, SOE placed an order for 153 Welman hulls with the Pressed Steel Company, Cowley, Oxfordshire. As prior to the war they had manufactured car panels, they were ideally suited to this task. To protect the security of this new submarine, the manufacturing process was compartmentalised. The order was also placed under the name 'floats, sweeps, Mk III' to hide its true identity.[45]

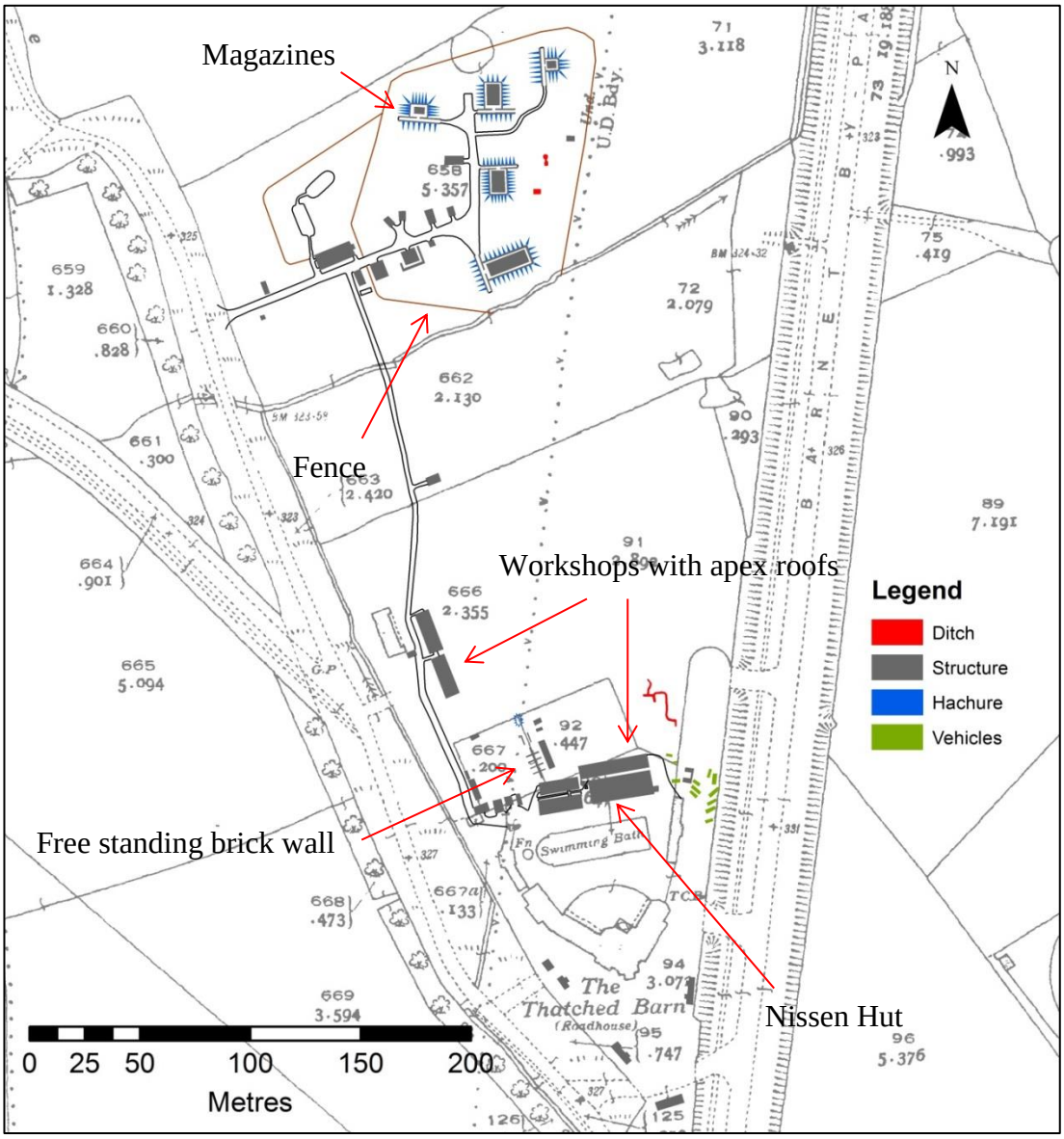

Figure 67: Aerial photographic transcription of The Thatched Barn. This facility was SOE's main centre for camouflaging equipment destined for occupied Europe.[46]

[45] Fredrick Boyce and Douglas Everett, *SOE* pp. 131, 133, 215, 233
[46] NMR RAF 3G/TUD/UK/88/5088 and NMR RAF/3G/TUD/UK/88/5089

Figure 68: The metal workshop (top) and props shop (bottom) in the grounds of the Thatched barn. On the wall of the prop shop is Buster Keaton's quote 'Silence is of the Gods; only monkeys chatter'.[47]

Once certain equipment had been manufactured, whether in-house or externally, it required a degree of camouflaging before it could 'pass' in occupied Europe. Outgrowing their workshop in the Victoria and Albert Museum, the Camouflage Section relocated to the Thatched Barn in June 1942 (*Figure 67*).[48] It

[47] TNA HS 7/49
[48] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 p. 3

was the responsibility of this department to undertake the final stage of equipment processing. This can be regarded as the most important stage in the production of supplies. Any indication that equipment was manufacture in the UK, or the devices true nature, would expose an agent during a routine search.

In order to camouflage equipment, SOE constructed a prop shop, a textile shop, a carpenters shop, a printing room, an art department, a compositors section, a plasterers shop, a paint shop, a paint spraying shop and a metal workers shop in the grounds of the Thatched Barn.[49] Magazines were also erected within a compound to the north of the workshops in order to store explosives onsite (*Figure 68*).

Item	**Quantity**
Tyre Burster	185,813
Incendiary Cigarette	43,700
Explosive Wood	700
Explosive Bicycle Pump	138
Explosive Oil Can	106
Explosive Rats	100
Protective Incendiary Briefcase (electrical)	81
Explosive Torch	50
Protective Incendiary Attaché Case (electrical)	39
Explosive Clogs	36 pairs
Protective Incendiary Suitcase (electrical)	30
Explosive Food Tin	24
Protective Incendiary Tobacco Tin (mechanical)	19
Incendiary Deed Box	11
Protective Incendiary Cigarette Box (mechanical)	6
Protective Incendiary Lady's Work Box (mechanical)	6
Explosive Coal	3.5 tons

Table 10: The quantity of equipment adapted and manufactured at The Thatched Barn, Station XV, prior to December 1944.[50]

[49] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 Photographs
[50] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 Part I – Devices

The relocation of SOE's Camouflage Section to the Thatched Barn provided the department space to expand. Eventually, they developed the capacity to adapt over 30 tons of arms and ammunition per month for a single Country Section (*Table 10*).[51] It was only through the direct investment in facilities at the Thatched Barn that SOE could camouflage material on this scale.

Storage Facilities

Once equipment had been manufactured, it was essential to store it until it was required in the field. Until June 1941, the storage of equipment by SOE occurred on an *ad hoc* basis. Items were kept at Aston House, a property inherited by the organisation from Section D. It was, however, the responsibility of this facility to undertake research, development and manufacture of sabotage equipment whilst also providing training in the handling of explosives.[52]

Until February 1941, the operational demands for supplies were limited. During this month, however, the Auxiliary Units placed an order with Aston House for 1,000 'mixed parcels' (*Table 11*).[53] The stores required for these packages were kept in a variety of small structures in close proximity to the main house at Aston. At the time, the segregation of explosive groups was only occasionally implemented. The organisation also kept some of their incendiaries in an unreliable condition and had yet to execute the regulations for the safe storage of dangerous material.[54] Despite these issues, SOE soon accumulated a floating stock of several tons of high explosives, incendiaries and other equipment at Aston House.[55] Until July 1942, all stores shipped from here were sent in plain or commercial cover packages.

[51] TNA HS 7/49 History and Development of the Camouflage Section 1941-1945 p. 4
[52] TNA HS 7/27 History of the Research and Development Section of SOE pp. 4, 5. This occurred in a disused chalk pit three miles from the house.
[53] The Auxiliary Units had been formed in July 1940 by General Ironside and led by Colonel Gubbins. It was the role of these units to operate behind the lines of an enemy force which had invaded the UK. See John Warwicker, *With Britain in Mortal Danger: Britain's Most Secret Army of WWII* (Bristol, 2002), David Lampe, *The Last Ditch: Britain's Secret Resistance and the Nazi Invasion Plan* (London, 2007) and Bernard Lowry and Mick Wilks, *The Mercian Maquis: The Secret Resistance Organisation in Herefordshire and Worcestershire during World War II* (Logaston, 2007).
[54] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII pp. 1, 2
[55] TNA HS 7/27 History of the Research and Development Section of SOE p. 5

Following this date, SOE managed to obtain official classifications from the Explosives Storage and Transport Committee for all of their devices.[56]

Item	**Quantity**
Copper Tube Igniters	24
Striker Boards	6
Pocket Tins Incendiaries	12
1hr Lead Delays / 3hr Lead Delays	20/50
Instantaneous Fuze	50
Cordtax	240ft (73.15m)
Detonators No. 8 or 27	100
Explosives	20lbs (9.07kg)
Safety Fuze Mk II Bickford	48ft (14.63m)
CE Primers	20
Tubes, Fuzes, Sealing	24
Crimping Tool	1
Tube Vaseline	1
Spool Trip Wire 0.32" (0.81cm) / 0.14" (0.36cm)	1/3
Coils Tape	8
Pull Switch / Pressure Switch	6/3

Table 11: Contents of the Auxiliary Unit Mark II. Although this was a list produced in July 1944, it illustrates the type of equipment allocated to the Auxiliary Units.[57]

On 9 June 1941, Professor Dudley Newitt was appointment Director of Scientific Research (DSR). This triggered a major reorganisation of the functions of Aston House and The Frythe. Research and Development was relocated to The Frythe whilst Aston House was tasked with production, supplies and stores.[58] This arrangement survived for the remainder of the war. Following this reorganisation, Aston House began the process of becoming a more professional depot.

[56] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII pp. 1, 3
[57] Alan Williamson, *East Riding Secret Resistance* (Midhurst, 2004) p. 23
[58] TNA HS 7/27 History of the Research and Development Section of SOE p. 7. Following this internal reshuffle, Aston House was organised into five new departments: Design, Production, Testing, Laboratory, Stores an Administration (TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII pp. 1, 2).

Aston House's disregard for contemporary magazine safety precautions came to a fore on 2 January 1942.[59] Whilst the staff from this facility were attending a New Year's party at the nearby Frythe, the incendiary magazines caught fire.[60] In the aftermath of this disaster, SOE undertook a reassessment of the nature of the storage facilities at Aston House. As an immediate response, surplus stores were removed from the premises and relocated to STS41, Fawley Court, Oxfordshire. To improve the segregation of the remaining equipment at Aston House, a number of elephant shelters were erected in the grounds (*Figure 69*).

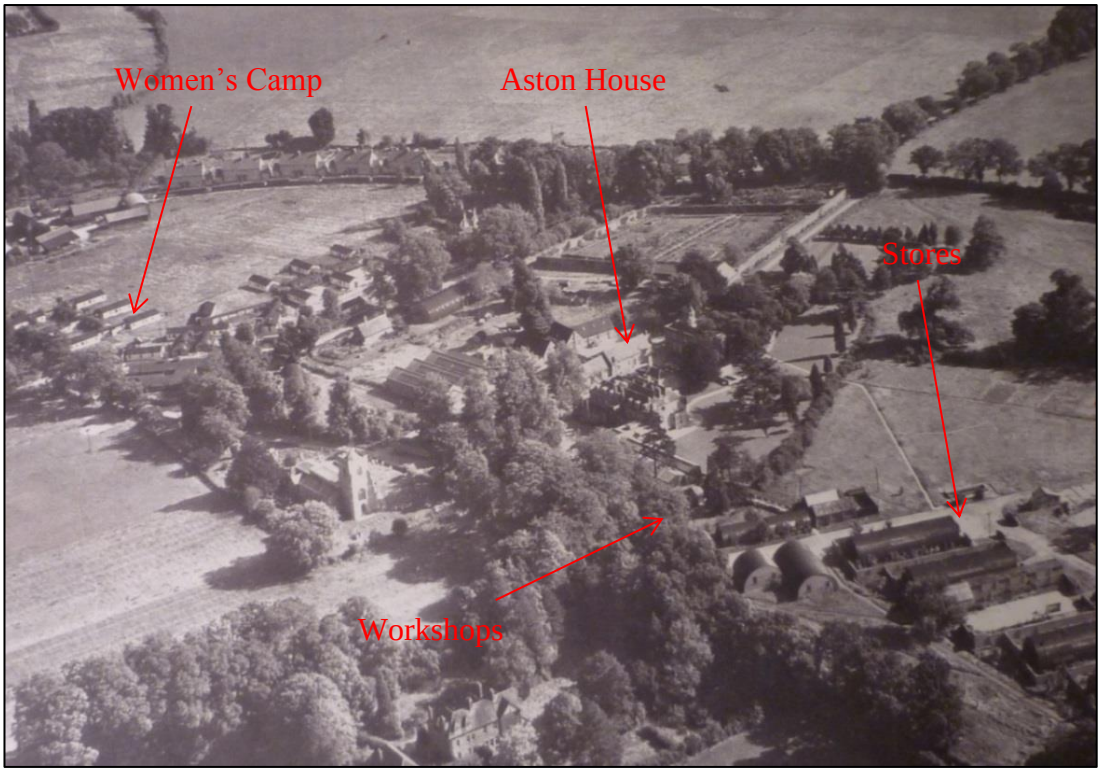

Figure 69: Aston House from the west. The large elephant shelters to the right of the picture housed general stores. Clustered around the main house were numerous workshops and testing facilities. To the left of the picture was the camp accommodation for the staff based at the facility. These were separated into men's and women's camps. A NAAFI and entertainment facilities were also provided by SOE at this site.[61]

[59] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII p. 2

[60] Much to the dismay of the commander of the local fighter squadron, no German aircraft were drawn to the glare of the fire which was visible for miles (Des Turner, *Aston House Station 12* p. 106)

[61] Private Collection

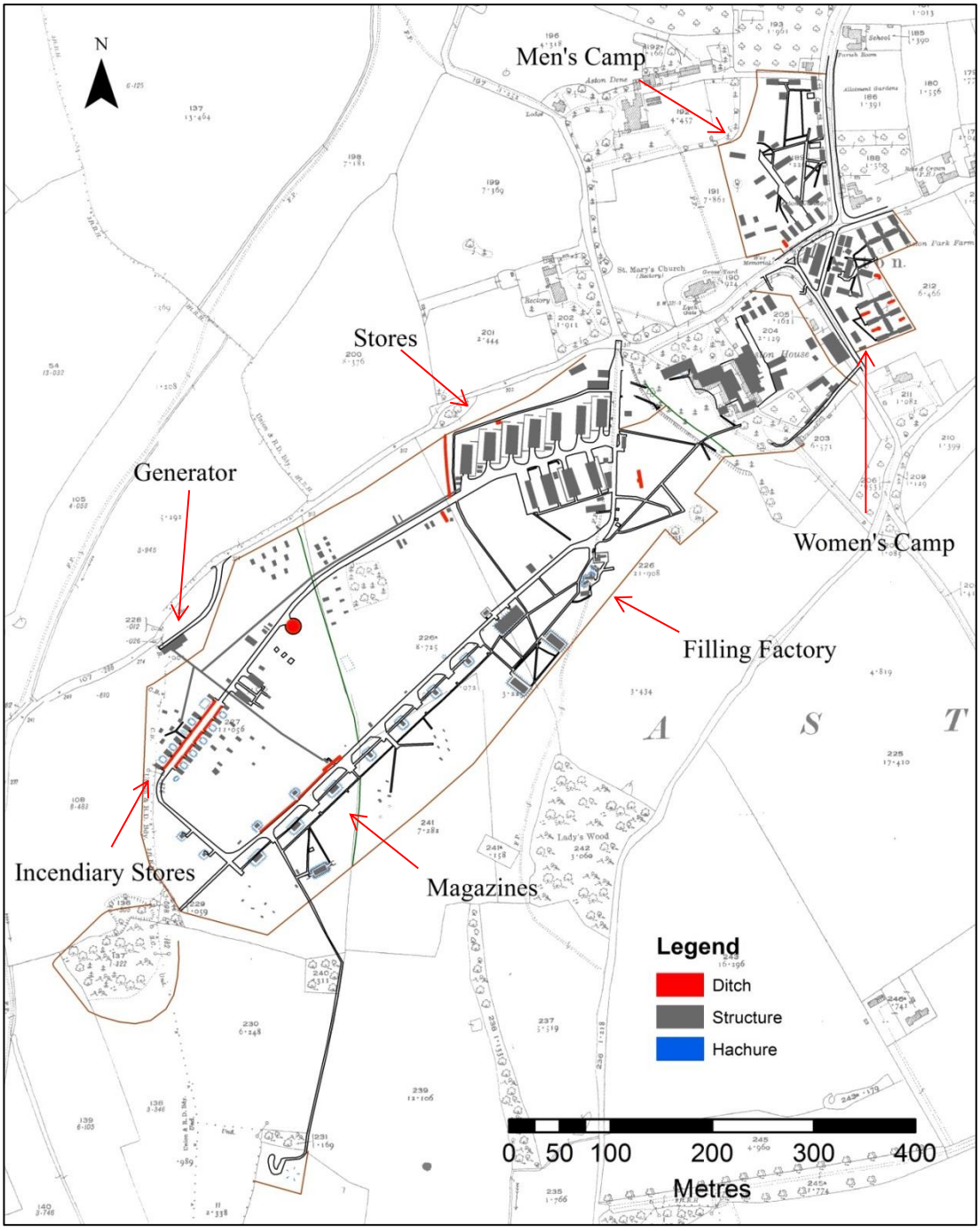

Figure 70: Site plan of Aston House based on aerial photography transcription. Following the fire at the facility, a substantial building programme was instigated. In order to limit the damage of another disaster, the new facilities were compartmentalised. Magazines were separated from incendiary stores at the periphery of the site. This ensured any damage was confined. In order to provide safe accommodation for their staff, the camps were constructed at the other end of the facility to the high explosives.[62]

[62] NMR RAF 106G/UK/961/3268 and NMR RAF 106G/UK/961/3269

The fire coincided with a period when it became apparent that a substantial expansion of the facilities at Aston House was required.[63] By this time, political support for SOE was more forthcoming. There was, consequently, the incentive to expand the organisations capacity to meet the potential increases in future operational requirements. Under the directions of 'Colonel F.T. Davies, plans were made for an extensive building programme comprising general stores, incendiary and explosive storage, accommodation for explosive filling and also a light engineering workshop' (*Figure 70*).[64] By early 1943, this programme of work was nearing completion. At this point a considerable and progressive increase in the staffing levels at this facility took place. By early 1945, a maximum of approximately 600 people were working on site.[65]

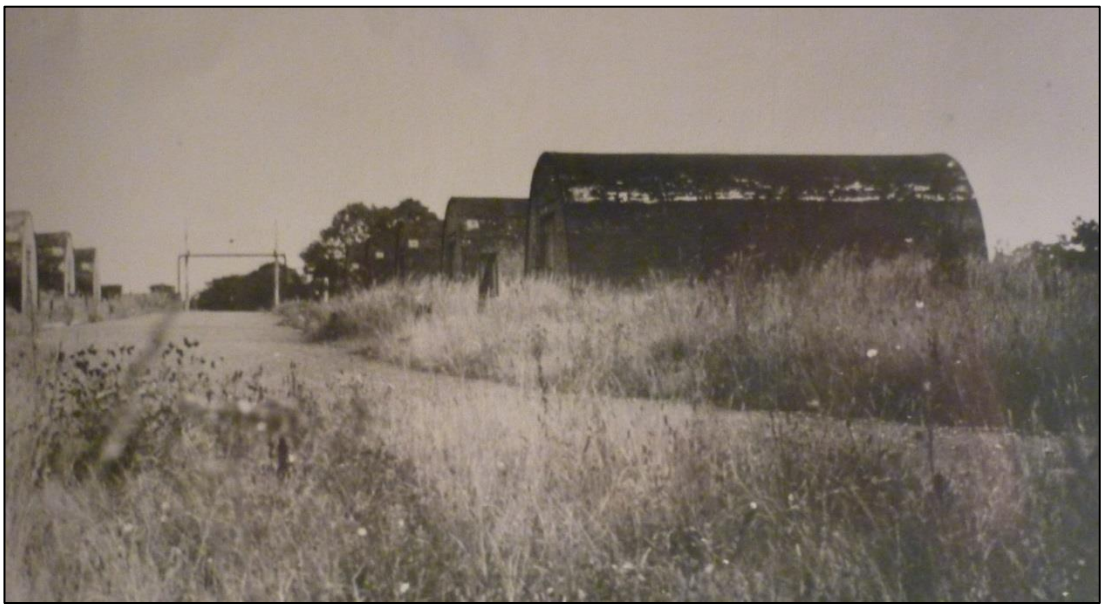

Figure 71: Storage facilities at Aston House. Located to the south-west of the main house, these structures are believed to be for the storage of incendiary devices. In the background, an overhead hot steam pipe can be observed. Heat was produced in the generator building and then piped round the facility.[66]

This period of expansion saw SOE obtain the services of personnel from the Royal Army Ordnance Corps (RAOC). The arrival of the RAOC to Aston House

[63] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII p. 2
[64] Ibid p. 2
[65] Ibid p. 2
[66] Private Collection

saw the introduction of a proper system of stores accounting. Although this was based on the standard ordnance procedure, some modifications to this system had to be introduced due to SOE's special circumstances. The RAOC also ensured that the explosives on site were segregated into their various groups and that the proper safety distances were maintained (*Figure 71*).[67]

The period of expansion at Aston House completely altered the nature of the facility. Through the compartmentalisation of the site and the redistribution of stores, SOE limited the potential disaster which might ensue following an accident or enemy action. Magazines were also constructed to ensure explosives were stored in a safe fashion.

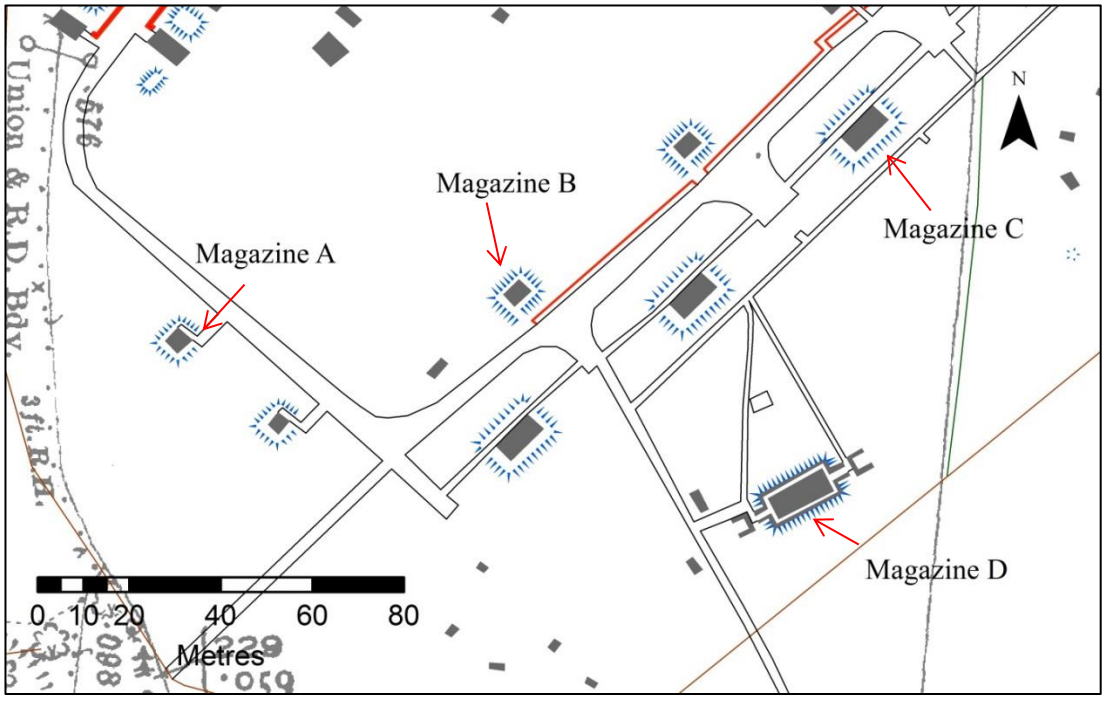

Figure 72: During the period of expansion at Aston House, the MCU constructed four distinct types of magazines. These were of unusual design as access to this was via a ramp which lorries delivering stores would drive down. Earthen bunds were also constructed up to the walls of the magazines.

Coinciding with the building programme at Aston House, SOE established the MCU to internalise the construction process. Aspects of the new facilities at this site reflect this practice. Contemporary magazines were designed to contain and

[67] TNA HS 7/27 SOE History Experimental Station 6 (War Dept.) otherwise known as Station XII pp. 1, 3

divert the force of an explosion thereby limiting collateral damage. This was achieved by building the structures at ground level, surrounding them with earthen bunds and limiting their overhead cover.[68] Although SOE's magazines at Aston House had similarities with standard designs, there were certain peculiarities. The MCU erected the structures below ground level, which had to be accessed via ramps, and built the earthen bunds right up to the external walls (*Figure 72*). Despite the non-standard nature of these facilities, contemporaries regarded the structures as 'high-class'.[69]

Figure 73: Bride Hall, Station VI, home to SOE's Small Arms Section. Within the two barns, workshops, stores and armourers were accommodated. In front of the barn is the petrol pump installed during the Second World War. SOE also constructed a firing range within the grounds of Bride Hall so that weapons could be tested before being despatched to the field.[70]

[68] Wayne Cocroft, *Dangerous Energy: The Archaeology of Gunpowder and Military Explosives Manufacture* (Swindon, 2000) p. 27
[69] TNA HS 7/46 SOE Handbook Supplies Organisation p. 5
[70] Fredrick Boyce and Douglas Everett, *SOE*

Although SOE's main storage facility was at Aston House, the organisation maintained separate facilities for the upkeep of small arms. By July 1941, the North Road Garage and at space made available at The Frythe, which included one hut and the dining room, were no longer sufficient for the organisation's requirements. The following month, SOE, therefore, planned to move their small arms to the nearby Brides Hall (*Figure 73*).[71]

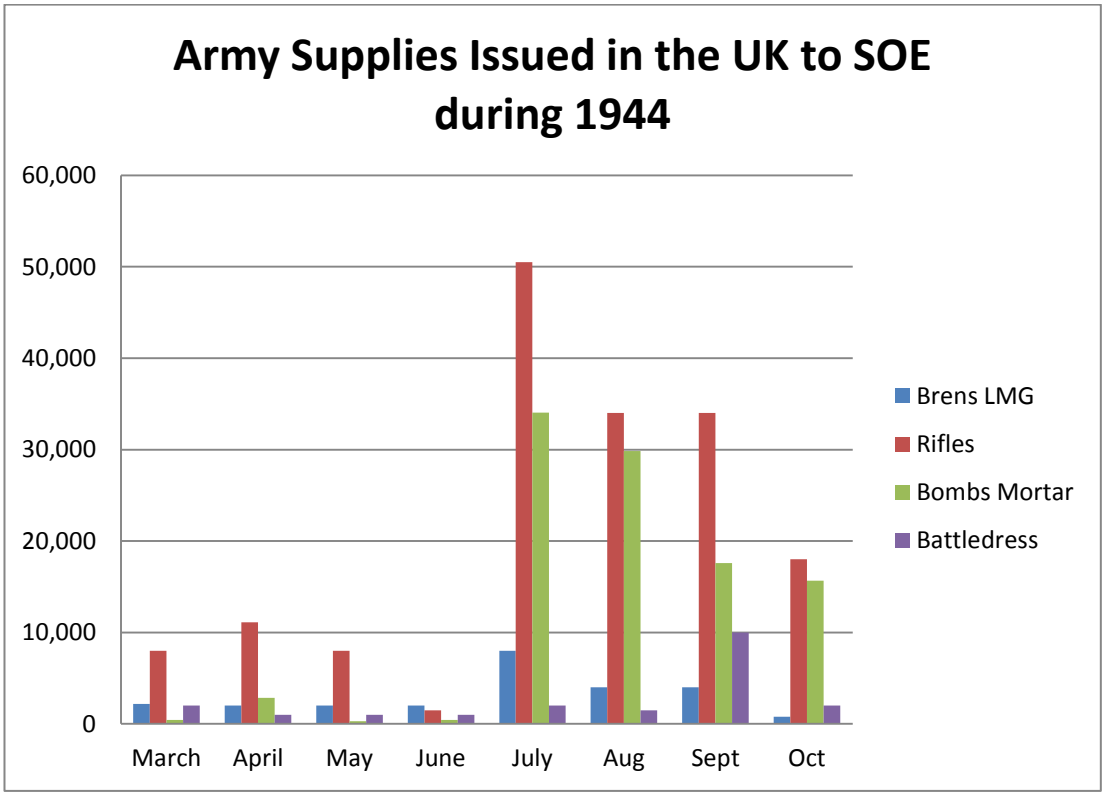

Figure 74: A selection of the Army supplies issued by SOE between March and October 1944. This graph shows that there was a significant peak in the number of submachine guns, rifles and mortor bombs in July 1944, the month after Operation OVERLORD. The peak in the number of battledresses issued did not occur until September 1944.[72]

The two spacious barns at Bride Hall were ideally suited for SOE's armoury requirements. On receipt of weapons, the Small Arms Section was responsible for their repairing, servicing and testing.[73] To facilitate this, a 30yds (27.43m) range was

[71] TNA HS 7/27 War Diary History of the Arms Section p. 2
[72] TNA HS 7/46 Appendix A to history on Army Stores
[73] SOE received small arms from a wide range of organisations. These included the armed services, manufacturers and weapons confiscated by the police.

constructed in the grounds. Over the operational life of Bride Hall, it is estimated that 100,000 pistols passed through this facility destined for the resistance in Europe (*Figure 74*).[74]

Item	**Quantity**
Explosive Plastic and 808	4,000 tons
Fuse, Cordex and Primacord	45,000,000ft (13,716m)
Grenades No. 36 (Mills)	5,000,000
SMG Stens	650,000
Ammunition 9mm	415,000,000 rounds
LMG Brens	68,000
Mortars 3"	3,000
Mines A/T Mk. V	100,000

Table 12: A selection of the Army supplies issued by SOE from 1940 to 1945.[75]

Item	**Yearly Issue to Country Sections/Missions**
Food (Chocolate, coffee, tea, milk and sugar)	180,000lbs (81,646.6kg)
Tobacco	30,000lbs (13,607.8kg)
Cigarettes	2,000,000
Spine Pads	5,000
Heel Pads	5,000 pairs
Ankle Bandages	5,000 pairs
Sleeping Bags	1,000
Bicycle Tyres	2,500 sets

Table 13: Main trade stores issued by SOE.[76]

[74] TNA HS 7/27 Station VI pg1, 3. This figure does not include all the other weapons, including rifles and submachine guns, which Bride Hall also stored. Each month, between 3,000 and 5,000 pistols and revolvers, together with ammunition, were supplied to the Country Sections by the Small Arms Section at Bride Hall (TNA HS 7/27 War Diary History of the Arms Section p. 6).
[75] TNA HS 7/46 Appendix B to history on Army Stores
[76] TNA HS 7/46 Appendix F Trade Stores p. 2

Over the course of the war, SOE's storage facilities underwent dramatic changes. The expansion of the organisation's capacity to handle stores in 1942 enabled vast quantities of equipment to pass through SOE (*Table 12*, *Table 13* and *Table 14*). Without this capability, the activities of the resistance within Europe would have been curtailed. All weapons received by the resistance 'were most gratefully received … [and when food was sent,] that was just too wonderful for words'.[77]

Item	**Quantity**
Bows (Arrows)	2 (24)
Bird Calls of 6 Birds	6 each
Dart Boards	4
Insulin	24 doses
Belly of Pork	½ lb
USSR Flag	1
Sea Fishing Lines and Hooks	4
Lighter Flints	7 grs
Cylinders of Oxygen	6

Table 14: Some of the varied Trade items SOE supplied to the resistance throughout the Second World War.[78]

Packing Facilities

Before supplies could be transported to the field, it was essential they were packed into containers to protect them during transit (*Figure 75*). The delivery of equipment within containers also allowed SOE to efficiently combine items into a single consignment. Between October 1941 and April 1942, this important task was undertaken from the stable block of Audley End House.[79] This *ad hoc* arrangement was potentially detrimental to the reputation of the organisation within the resistance.

[77] Roderick Bailey, *Forgotten Voices of the Secret War: An Inside History of Special Operations during the Second World War* (London, 2008) p.257
[78] TNA HS 7/46 Appendix F Trade Stores pp. 3-4
[79] Ian Valentine, *Station 43: Audley End House and SOE's Polish Section* (Stroud, 2006) pp. 73-4

If SOE could not guarantee the safe delivery of supplies requested by the field, their authority to coordinate the resistance networks could have been undermined.

Figure 75: The Type 'C' container, as shown at the Office of Strategic Service's (OSS) packing facility at Holmewood, was of a cylindrical shape formed from reinforced sheet metal. Split into two, the container was secured with three latches which once unlocked allowed it to open fully along its length.[80]

In early 1942, SOE took the decision to relocate their Packing Section to the spacious Gaynes Hall. Despite this move, concerns were raised over the quality of the packers' work. On 9 February 1943, Colonel Chichaeff of the Soviet Armed Forces complained about the 'inefficient work at Station 61 [Gaynes Hall] in an alleged mixing up on one occasion of containers for agents destined for Holland and Belgium respectively'.[81] The Court of Enquiry determined that the mistake, which

[80] Pierre Lorain, *Secret Warfare: The Arms and Techniques of the Resistance* (London, 1983) p. 110. The container was 1.72m long and 38cm in diameter and could accommodate most weapons including rifles and Bren guns; alternatively three smaller cylinders could be inserted A Polish Captain who was concerned about difficulties burying a 'C'-type container in hard soil found in his country, developed a new design which became the type 'H' container. Formed from five interlocking cells, the H-type container was held together by rods with locking levers and safety pins. After withdrawing the rods, the five cells could be individually removed from the drop zone. Fredrick Boyce and Douglas Everett, *SOE* pp. 181-2.

[81] TNA HS 4/349 DCDO/523 09/02/43

had occurred in 1942, was the result of 'labels on the containers must have become detached and been substituted either between the packing office and the aerodrome or at the aerodrome itself … [Consequently,] the whole procedure in respect of despatch of containers was overhauled and there now exists no possibility of such a substitution occurring in the future'.[82]

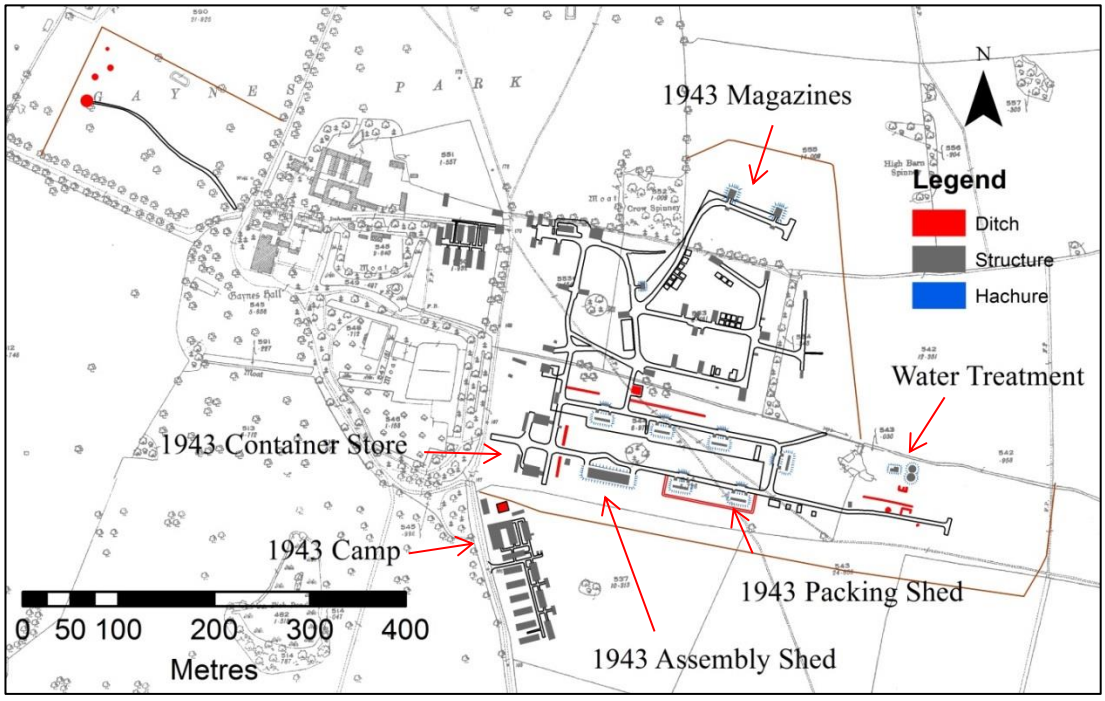

Figure 76: Gaynes Hall, Station 61, home to SOE's Packing Section from 1942. In the summer of 1943 a decision was taken to substantially increase the facilities capacity.[83]

It was the availability of space at Gaynes Hall which drew SOE to the property. This provided the organisation ample capacity to expand their packing capabilities when necessary. Within a year of the move, the facilities at Gaynes Hall were determined to be inadequate. In the summer of 1943, SOE took the decision to rectify this and initiated a programme of building work. This saw the construction of six large packing sheds, two magazines, one assembly-shed, two container stores and a new camp (*Figure 76*).[84]

[82] TNA HS 4/349 DP/RU/1401 19/02/43 p. 2
[83] NMR RAF 106G/UK/635/3340
[84] TNA HS 7/50 Packing p. 1

Year	Total containers packed at Station 61	% increase
1942	2,176	-
1943	13,435	517
1944	56,464	320
1945	4,334	-92
Total	76,504	

Table 15: The number of containers packed at Gaynes Hall. Between 192 and 1943, the capacity of Gaynes Hall to pack containers substantially increased. [85]

In June 1942, prior to the start of the major building programme at Gaynes Hall, SOE introduced a series of standardised container contents.[86] This provided the resistance with predetermined combinations of supplies from which they could order. The development of fixed contents inevitably resulted in a more proficient packing procedure. This, combined with the new efficient site layout, allowed the packers at Gaynes Hall to increase their annual output by 2,494.8% between 1942 and 1944 (*Table 15*). Whilst only increasing their staffing figures by 1,400% over the same timeframe (*Table 16*). Over the operational life of this facility, over 10,000 tons of equipment was packed into containers destined for the resistance operating within Europe.[87]

Date	Staff	% increase
On formation	10	-
September 1942	30	200
April 1943	80	167
September 1943	130	63
March 1944	150	15

Table 16: The changing staffing levels at SOE's packing facility at Gaynes Hall. As the war progressed, the number of staff at Station 61 gradually increased.[88]

[85] TNA HS 7/50 Packing p. 1
[86] The standard contents for the 'A350', arms and ammunition package, included 5 Sten guns complete with accessories and magazines, 1500 rounds of 9mm for a Parabellum and 10 field dressings packed into a 'C' container (TNA HS 7/50 Standard packages July 1944).
[87] TNA HS 7/50 Packing pp. 1, 2
[88] Ibid p. 2

In 1944, two years after the USA entered the war, the Office of Strategic Services (OSS) began packing supplies destined for the resistance in Europe.[89] To prepare the organisation for this complex task, officers and NCOs from the OSS were attached to Gaynes Hall in February 1944 to observe SOE's procedures. Within a month, SOE deemed their 'students' capable of independent work. The OSS, subsequently, moved into their new packing facility known as 'Area H' located at Holme, Peterborough (*Figure 77*).[90]

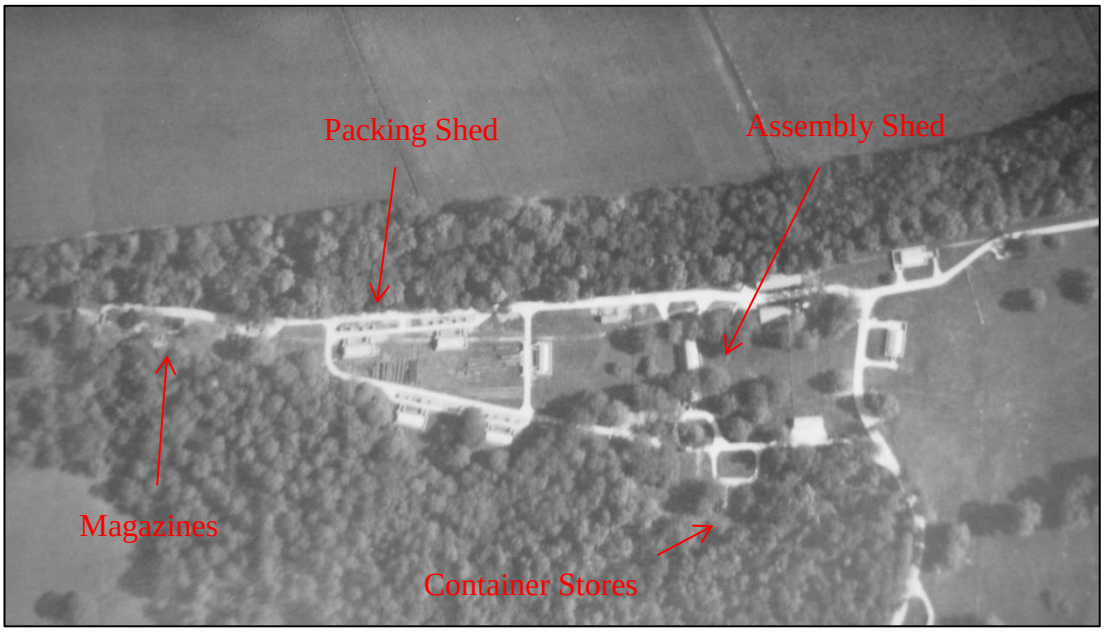

Figure 77: Area H, Holme, home to the OSS's packing facility. The footprint of the structures erected at the American packing station, known as Area H, were identical to the 1943 expansion at Station 61.[91] *The containers packed at this site were transported to the resistance from RAF Harrington.*[92]

OSS's Area H displayed similarities with Gaynes Hall in its site morphology and structural typology (*Figure 78*). This is indicative of either the construction of the facility occurring under the close supervision of SOE or the work being undertaken by the MCU. With three years of experience in packing containers, SOE had optimised the flow of equipment through the facility. By supporting the OSS in their development, SOE ensured that they were starting from a position of strength.

[89] The OSS was the American version of SIS and SOE combined.
[90] TNA HS 7/50 Packing p. 3
[91] Ibid p. 3
[92] English Heritage 106G/UK 1557 07/06/1946 540

The guarantee that the OSS could provide a professional service was of strategic value to SOE. If the resistance observed the delivery of substandard supplies, the organisations legitimacy to control these disparate groups might have been undermined. Consequently, 'all special containers continued to be packed at Station 61, the only reason being that years of experience counted in the packing of specials, the most difficult task being to get the correct centre-of-gravity and still ensure the maximum pay-load'.[93] The OSS was only trusted to pack the easiest containers.[94] Arrangements were also made so that if the OSS 'ran into any snags and run into them they did, one of St. 61's [Gaynes Hall] Officers would go over to Area H [Holme] and help to put them on the right road again'.[95]

Figure 78: One of the magazines at Area H. Since the end of the Second World War, all of SOE's structures at Gaynes Hall have been demolished and replaced with a prison. As nothing survives there, Area H is a valuable analogy for visualising SOE's facility.[96]

[93] TNA HS 7/50 Packing p. 3
[94] TNA HS 7/50 History of the Packing Stations within SOE p. 4
[95] Ibid p. 4
[96] Author 2012

For certain items, the best form of transportation was in panniers not in containers. These were made up at a packing station SOE had formed at the heart of RAF Henlow. During 1940, the work was conducted from a small office, 9ft x 8ft (2.74m x 2.43m), under extreme security. Over the duration of the war, SOE's workspace at this airfield expanded to 8,000ft^2 (743.22 m^2). Between May 1942 and January 1945, the output of this facility totalled 19,863 packages, 10,900 harnesses manufactured and 27,980 parachutes modified and packed. This was all done under strict secrecy at the centre of one of Britain's busiest RAF stations.[97]

In advance of Operation OVERLORD, SOE began contemplating the challenges of providing the French Resistance with a greater quantity of medical supplies. These would be essential for the networks following the invasion. The organisation had been advised that during the French campaign, 50,000 casualties were to be expected. Immediately, SOE requested the War Office supply the organisation with 102 special 'Medical Units'. These would have been sufficient to treat 15,000 casualties. Arrangements were then made with the Deputy Assistant Director of Medical Services of the Airborne Division for additional medical equipment. By August, SOE had placed an order for a further 100 tons of medical stores. To pack this vast quantity of supplies, it was necessary for the organisation to establish a Medical Supplies Packing Station which became known as ME10.[98] By the following month, the facility was already in a position to take their first delivery of supplies.[99]

The careful packing of equipment into containers was an essential aspect of SOE's supply chain. Without some form of protection, vital supplies might get damaged in transit. Through trial and error, SOE identified the optimal method of packing the wide variety of equipment with which they supplied the resistance.

[97] TNA HS 7/50 History of the Packing Stations within SOE p. 2
[98] The location of Medical Supplies Packing Station (ME10) is unknown.
[99] TNA HS 7/46 Appendix C Army Stores p. 6

Archaeological Remains

Following the end of the Second World War, SOE's packing facility at Gaynes Hall was converted into HMP Littlehey (*Figure 79*). This redevelopment was likely to have had implications for the survival of archaeological remains associated with the packing of supplies. In the open spaces within the prison compound, traces of SOE's facility might endure beneath the surface. Artefacts associated with the packing of containers could also be uncovered during archaeological excavations. In contrast, a significant proportion of the OSS's Area H survives above ground (*Figure 78*).

Figure 79: Google Earth image of Gaynes Hall, now HMP Littlehey. The redevelopment of the site has potentially impacted the survival of remains associated with SOE's Station 61.

Following the end of hostilities, SOE's storage facility at Aston House was also demolished. The site was subsequently converted into a golf course. There is, therefore, a high probability that remains, including the foundation of buildings, submerged magazines and artefacts, survive buried beneath the ground.

SOE's Supply Chain: Equipping the Resistance

Throughout the Second World War, supplies from the UK were vital to the resistance within Europe.[100] Following the occupation of a country by the German invaders, items which were deemed to threaten their control were confiscated.[101] Without access to military hardware, the resistance could not have functioned effectively. Stockpiles, therefore, had to be re-established. Failure to provide the resistance with effective and reliable equipment would have undermined SOE's authority. Dispersed groups might have continued operating in isolation as there was little incentive to come under the control of the Allies.[102]

Prior to 1942, the production, storage and packing of supplies destined for the resistance in occupied Europe was undertaken on an *ad hoc* basis by SOE. Equipment, which was manufactured on behalf of the organisation, was kept in unsuitable structures in the grounds of Aston House. Small arms, however, were stored in the dining room of The Frythe and in the North Road Garage. These would then be despatched to the stable block at Audley End to be packed into containers. As this coincided with a period in which the resistance was in its infancy, there was little incentive to invest scarce resources in developing a proficient supply chain.

In 1942, SOE's supply infrastructure started to evolve, develop and become more professional. The packing of containers relocated from Audley End to Gaynes Halls, the armoury transferred to Brides Hall and a substantial building programme was initiated at Aston House. During this year, the Camouflage Section also acquired the Thatched Barn whilst the Forgery Section expanded into the whole of Briggins.

SOE's supply chain was reliant on the pre-existing transportation system formed from the Great North Road and Great Northern Railway. This provided the organisation access to an efficient and comprehensive logistics network. Proximity to these public highways, however, had potential security implications. As SOE's supply chain integrated itself into a public transportation system, the organisation became more visible within the landscape. In 1942, the Camouflage Section relocated to the Thatched Barn which was located on a major intersection. In

[100] Roderick Bailey, *Forgotten Voices of the Secret War* p. 354
[101] Charles Cruikshank, *The German Occupation of the Channel Islands: The Official History of the Occupation Years* (Channel Islands, 1975) p. 115
[102] Although these isolated, independently working groups would have been well intentioned, the lack of coordination might have been detrimental to the wider effort.

contrast, the previous year SOE had relocated their armoury to Bride Hall, 'miles from anywhere'.[103] As the war progressed, the need for an efficient supply chain trumped security.

Over time, as the resistance gained experience and members, requests for supplies increased. It was the responsibility of Aston House and Section E to ensure that these demands were met.[104] Although certain specialist items had to be manufactured in-house, SOE subcontracted the majority of their manufacturing process. The organisation, however, also needed standard military hardware to function. These could be obtained through the War Office and by September 1942 'were large enough to be considered in competition with other users'.[105]

SOE's capacity to handle the vast quantities of supplies required by the resistance was only possible through the expansion of Aston House and Gaynes Hall. This infrastructure allowed SOE to pack 56,464 containers in a single year. Without this equipment, the capacity of the resistance would have been discernibly curtailed. The next stage in SOE's logistic network was to transport the supplies to the field, this is the subject of the following chapter.

[103] TNA HS 7/27 Bride Hall
[104] TNA HS 7/46 Appendix E p. 1
[105] TNA HS 7/46 Appendix C p. 1

CHAPTER VI
Transportation

Once equipment had been packed into containers, it was ready for delivery to mainland Europe. It was essential for SOE's reputation that provisions could be reliably and efficiently transported to the field when requested.[1] Although supplies were vital to the resistance, the RAF, Royal Navy and SIS initially obstructed SOE's efforts to establish links with occupied Europe. As an immediate response to the Fall of France, the organisation established a maritime network with the Brittany coast. Operational control of this link was, however, transferred to the Admiralty's Naval Intelligence Division (NID) in 1942. The only connection with Europe which remained under the control of SOE throughout the war was, consequently, the 'Shetland Bus'. As the organisation gained operational experience, it became apparent that aircraft were better suited to their specific needs. It was not, however, until the end of 1941 that a reluctant RAF began increasing the number of aeroplanes available for 'special duties'. Without the support of the RAF, SOE would have been unable to function.

Although the exploits of the aircrews and ships establishments have been covered in detail elsewhere, the transportation hubs have received little, if any, attention.[2] This chapter will address this oversight. Through an analysis of SOE's transportation hubs, light will be shed on the organisation's relationships with the Royal Navy, the RAF and SIS.

[1] Although during the First World War there were occasions when agents were transported being enemy lines by aircraft, this was still a new operational field in which procedures had yet been formalised (David Oliver, *Airborne Espionage: International Special Duties Operations in the World Wars* (Stroud, 2005) p. 4).

[2] The main research published on supplying the resistance is by Hugh Verity, *We Landed By Moonlight: Secret RAF Landings in France 1940-1944* (Manchester, 2010), Brook Richards, *Secret Flotillas: Clandestine Sea Operation to Brittany 1940-44* (Barnsley, 2012) and David Oliver, *Airborne Espionage*.

The Nature of SOE's Transportation Hubs

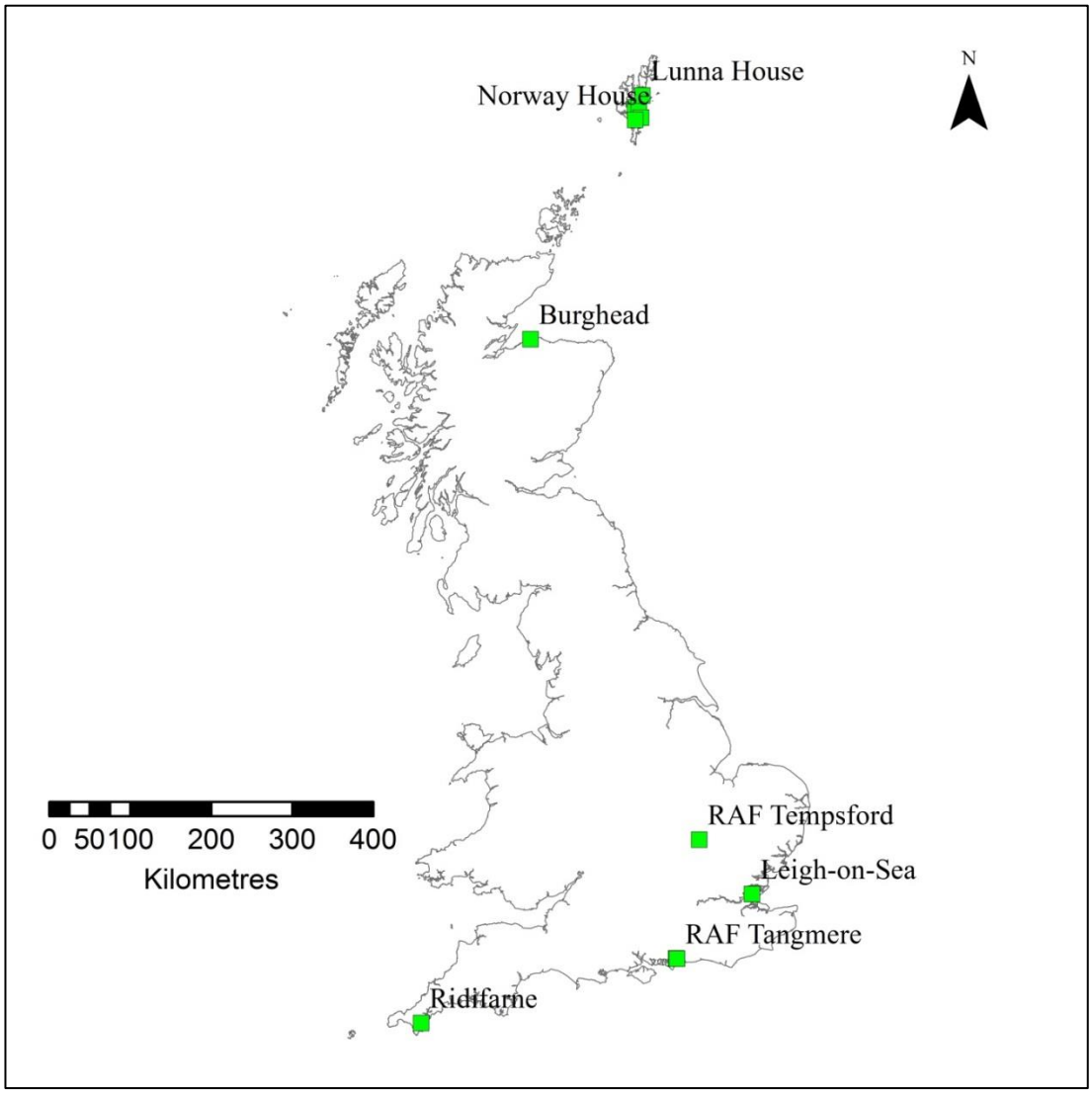

Figure 80: SOE's transportation hubs were spread across the UK. It was not until 1942 that the organisation lost operational control of the Helford Flotilla and began focusing on airborne links to the continent. The lack of transportation hubs is a distinguishing feature of this distribution. As ships were to quickly prove inappropriate, SOE's focus turned to aircraft. These were not constrained to specific routes and could refuel at satellite airfields on route. It was, therefore, possible to centralise the two squadrons allocated to the Secret Service at a single airfield.

Maritime Operations

To reach those groups resisting German occupation throughout Europe, SOE had to establish and maintain maritime and airborne transportation networks (*Figure 80*). The organisation's seaborne links to the continent were operated from two hubs within the UK. These links were known as the 'Helford Flotilla' and the 'Shetland Bus'. Until 1942, SOE was contemplating opening a further connection to the continent from Leigh-on-Sea, Essex.[3] Although never coming to fruition, this debate coincided with a marked decline in SOE's utilisation of seaborne transportation.

The 'Helford Flotilla'

Following the Fall of France in June 1940, SIS came under increasing pressure from the Directors of Naval, Military and Air Intelligence to provide a minimum of 72 hours warning of a German invasion. In order to achieve this objective, it was essential that the organisation could transport agents and intelligence to and from occupied Europe. The task of establishing SIS's link befell Commander Frank Slocum of the Operations Section. As the Battle of France and the Battle of Britain were undermining the RAF's spare operational capacity, Slocum focused his efforts on establishing a maritime link with Europe. Initially, these were maintained on an *ad hoc* basis utilising any fast surface craft he could borrow. Despite increasing pressure to undertake more operations, between 20 June and 12 October 1940 Slocum's section only managed 16 attempts to the north coast of France, five to the Channel Islands, six to Belgium and six to the Netherlands.[4]

Slocum also faced internal competitors within SIS who were also trying to establish links with the continent. On 20 June 1940, Leslie Humphreys, who had

[3] Prior to August 1942, SOE's Dutch (N) Section ran a shore facility at 8 High Street, Leigh-on-Sea, Essex. Consisting of a small cottage and access to Messrs. Bundock Bros. boatyard, the base was home to two Dutch fishing boats. The facility cost £74.18.4 per annum to maintain with £27 monthly overheads in wages and was unfurnished except for camp beds, blankets and dinghies (TNA HS 8/792 Base 8 High Street, Leigh-on-Sea MON1/O.21/663 22/08/42 p. 1-2). In August 1942, control of this establishment passed to the Dutch directorate of the Operations Section (MO/N) and maintained 'pending a decision regarding the establishment of an East Coast Base' (TNA HS 8/792 Base 8 High Street, Leigh-on-Sea MON1/O.21/663 22/08/42 p. 1). One proposal for the future of this shore facility was to utilise it for para-naval training (TNA HS 8/792 From D/Navy To MT DSR 12/10/42). This, however, coincided with a period when SOE was discussing ending all para-naval training.

[4] Brook Richards, *Secret Flotillas* pp. 25, 26, 30

been assigned to Section D, escaped from France on a warship.[5] On returning to the UK, he was tasked with establishing a link back to occupied France. By the following month, Humphreys was already in a position to attempt to land three agents by sea. As his section was part of SIS, he was, however, reliant on Slocum to provide transportation. As his Operations Section was beset by demands, Slocum classed Section D as a low priority. This lack of support forced Humphreys to seek alternative forms of transportation under Section D's exclusive control.[6]

Section D, therefore, commissioned Captain John Dolphin to locate a suitable small vessel in order to establish a line of communication with occupied Europe. Identifying a Belgium motor yacht at Newlyn, Cornwall, the ship was requisitioned, fitted out and renamed No. 77. Section D now had the capabilities of attempting to infiltrate agents into France by sea. The first operation did not occur, however, until after the formation of SOE. On 1 August 1940, the crew of No. 77 left the UK with three agents and Captain Gerry Holdsworth of the Intelligence Corps aboard.[7] The operation, however, was abandoned after coming into contact with a German patrol vessel. Following this failed attempt, SOE had to rely on Slocum for the next 10 operations, all of which were abandoned before reaching France. The failure of SIS's Operations Section strengthened SOE's resolve to establish independent transportation links with the continent.[8]

In the autumn of 1940, Holdsworth, now a Commander, was reassigned by SOE to Newlyn, Cornwall.[9] Unofficially, he was tasked with establishing a facility from which a maritime link with France could be operated. In October, this assignment became officially endorsed when financial support to equip and run the base was obtained.[10]

After investigating suitable locations, Holdsworth decided the Helford Estuary, Cornwall, was ideal for SOE's requirements. The lack of military infrastructure in the vicinity of this secluded natural harbour ensured the establishment of a clandestine fleet would pass relatively unnoticed. On 5 November

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[5] Michael Foot, *SOE in France: An Account of the Work of the British Special Operations Executive in France, 1940-1944* (London, 2006) p. 21
[6] Brook Richards, *Secret Flotillas* pp. 85-6
[7] Captain Holdsworth regarded No. 77 as inappropriate for its intended role as the vessel was both slow and noisy.
[8] Brook Richards, *Secret Flotillas* p. 86-7
[9] Prior to joining SOE, Holdsworth was associated with the establishment of the British Auxiliary Units by Section D.
[10] Brook Richards, *Secret Flotillas* pp. 97, 99

1940, he approached the Naval Office-in-Charge at Falmouth, Cornwall, to obtain permission to form a base on the Helford Estuary.[11] Authorisation was duly received for this venture.

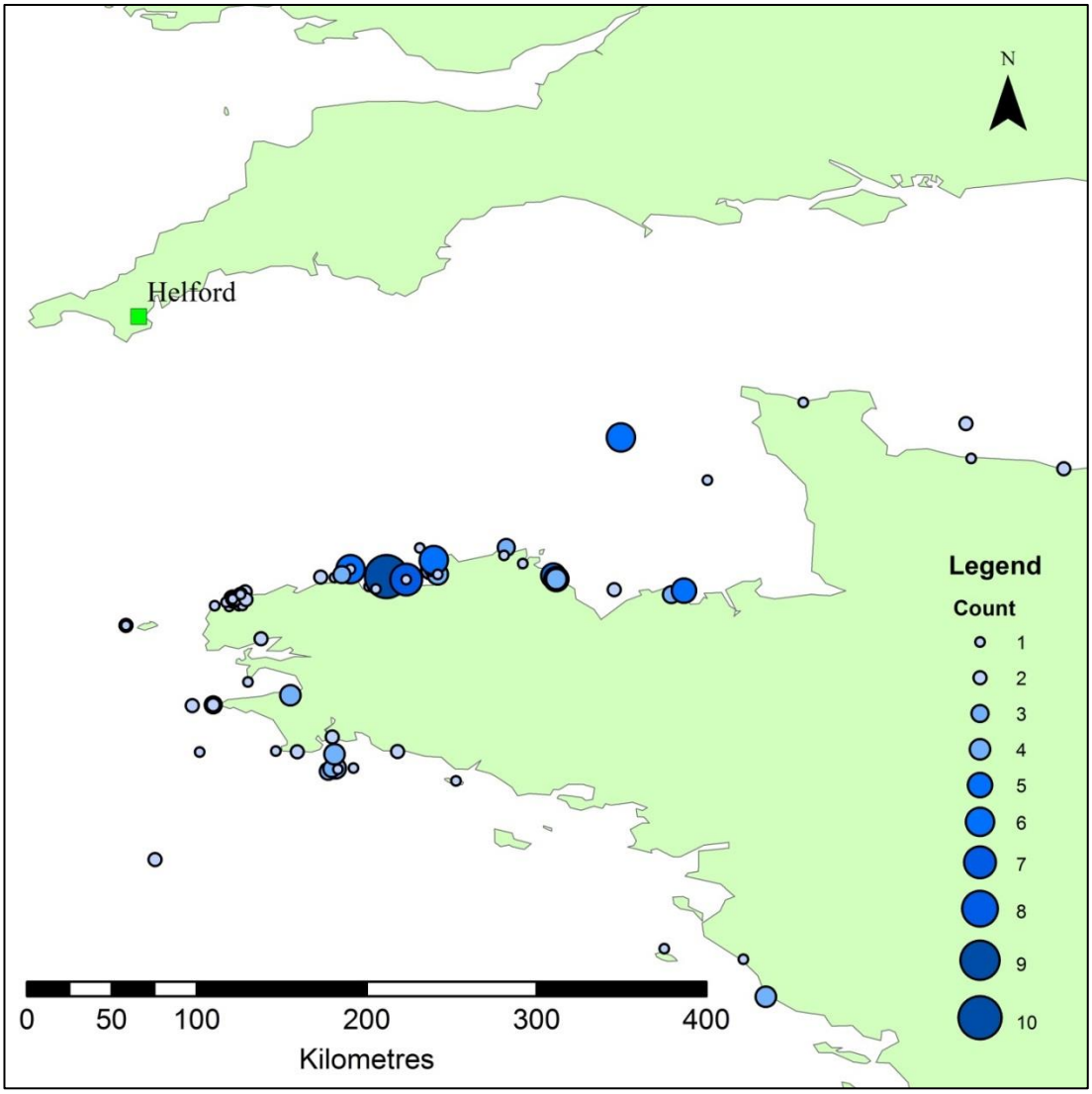

Figure 81: The Helford Estuary was identified by Commander Holdsworth in 1940 as the most suitable location for the establishment of a maritime hub linking the UK to France. Numerous buildings were requisitioned along the estuary to support the activities of the Helford Flotilla. The physical geography of the western coast of France made it ideally suited to clandestine activities. This composite map of the number of maritime operations undertaken by the Helford Flotilla over the course of the Second World War clearly indicates the importance of the north Brittany coast.[12]

[11] Brook Richards, *Secret Flotillas* p. 99
[12] Data taken from Brook Richards, *Secret Flotillas* pp. 304-30

The strategic location of Helford Estuary was ideal for Holdsworth's intended area of operations. Shortly after being tasked with establishing a maritime link with France, he had identified the Brittany coast as ideally suited for clandestine rendezvous (*Figure 81*).[13] Home to smugglers across the centuries, this rugged coast consisted of coves, inlets and uninhabited offshore islands.[14] This provided numerous locations where vessels could unload and stockpile stores hidden from enemy sentries. The rocky nature of the Brittany coastline also meant it was unsuitable for an amphibious invasion force. Defensive military installations were, therefore, small in number and widely spaced.[15] Although other harbours existed in south-west England from which SOE could choose, minefields, journey times and routes to the operational area made these sites unsuitable.

Figure 82: Ridifarne, home to the shore establishment of the Helford Flotilla. Located next to a pool in the estuary, this location allowed SOE's ships to remain afloat at all tides.

[13] Brook Richards, *Secret Flotillas* p. 97
[14] T Le Goff, T and D Sutherland, 'The Revolution and the Rural Community in Eighteenth-Century Brittany', *Past and Present*, 62 (1974) p. 100
[15] J Kaufmann and Robert Jurga, *Fortress Europe: European Fortifications of World War II* (Conshohocken, 1999) pp. 383, 388

The first property requisitioned by Holdsworth on the Helford was at Helston. This was, however, to prove inconvenient as it was located too far upstream which meant vessels could only access it at high water. SOE's base was shortly, thereafter, relocated to Ridifarne on the north bank above the Helford Passage (*Figure 82*). Situated next to a pool in the estuary, boats anchored here could remain afloat at all tides.[16]

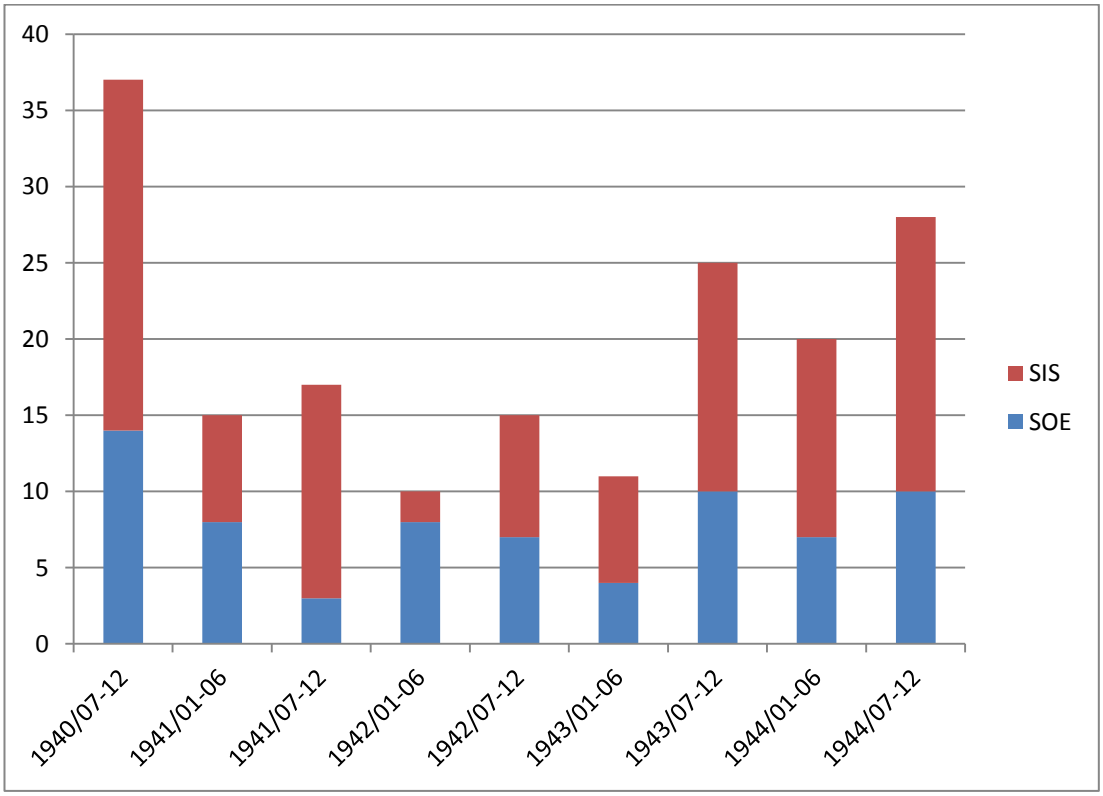

Figure 83: A comparison of the number of operations undertaken by the Helford Flotilla on behalf of SOE and SIS. Despite control of this facility being transferred to NID in 1942, the number of missions undertaken for SOE remained relatively constant.[17] Over the course of the war, the number of operations undertaken by the Helford Flotilla would not have coped with the sheer volume of SOE's supplies for the resistance.

Early in 1942, Slocum was attached to Rear-Admiral John Godfrey's NID and was allocated the position of NID (Clandestine). This coincided with an Admiralty directive which placed all SOE vessels at Helford under the operational

[16] Brook Richards, *Secret Flotillas* p. 99
[17] Data taken from Brook Richards, *Secret Flotillas* pp. 304-30

control of NID. Justification for this was based on the desire to ensure that there would be no clashes in operational schedules. Too much activity in the English Channel would inevitably lead to a greater German presence. This would compromise the security of all missions, clandestine or otherwise. The issuing of this directive nullified SOE's independent maritime link to occupied France.[18] Despite losing the operational control of the Helford Flotilla, the number of missions undertaken on their behalf remained relatively constant throughout the war (*Figure 83*).

The physical nature of SOE's facility on the Helford Estuary to support their clandestine fleet is unknown. It is known, however, that their staff were accommodated in a number of pre-existing buildings. To ensure the reliability of their ships, it would have been necessary for the organisation to provide engineering facilities. The establishment of SOE's shore facility on the Helford was the direct result of operational necessity. Slocum's reluctance to support SOE during 1940, combined with the lack of available aircraft, limited the organisation's capacity to undertake missions. Necessity, therefore, forced SOE to establish an independent maritime link with occupied France.

The 'Shetland Bus'

Throughout the Second World War, the Shetland Islands were an important link between occupied Norway and the UK. Their close proximity, cultural and historical connections and sparse population made them ideal for sheltering a clandestine fleet working with Scandinavia.[19] As early as 1940, plans were discussed to establish a shore facility base from which Norwegian fishing boats could operate. Initially conceived as a joint facility with SIS, this establishment became a purely SOE operation (*Figure 84*).[20] By the end of 1941, it had been decided that a supplementary base on the Scottish mainland was necessary. Burghead, on the Moray Firth, was chosen to accommodate this new shore facility. Under the

[18] Brook Richards, *Secret Flotillas* p. 140-1.
[19] Kaare Iversen, *Shetland Bus Man* (Lerwick, 2004) p. xiii. Norwegian fishermen, well acquainted with the North Sea, knew that if the weather was favourable, they could reach the Shetland Islands in a single day.
[20] TNA HS 7/174 History of the Norwegian Section 1940-1945 p. 11. SIS, therefore, had to arrange their own transport to Scandinavia the method of which is unknown.

commander of Captain H Marks, this base was brought into operation by the close of the season.[21]

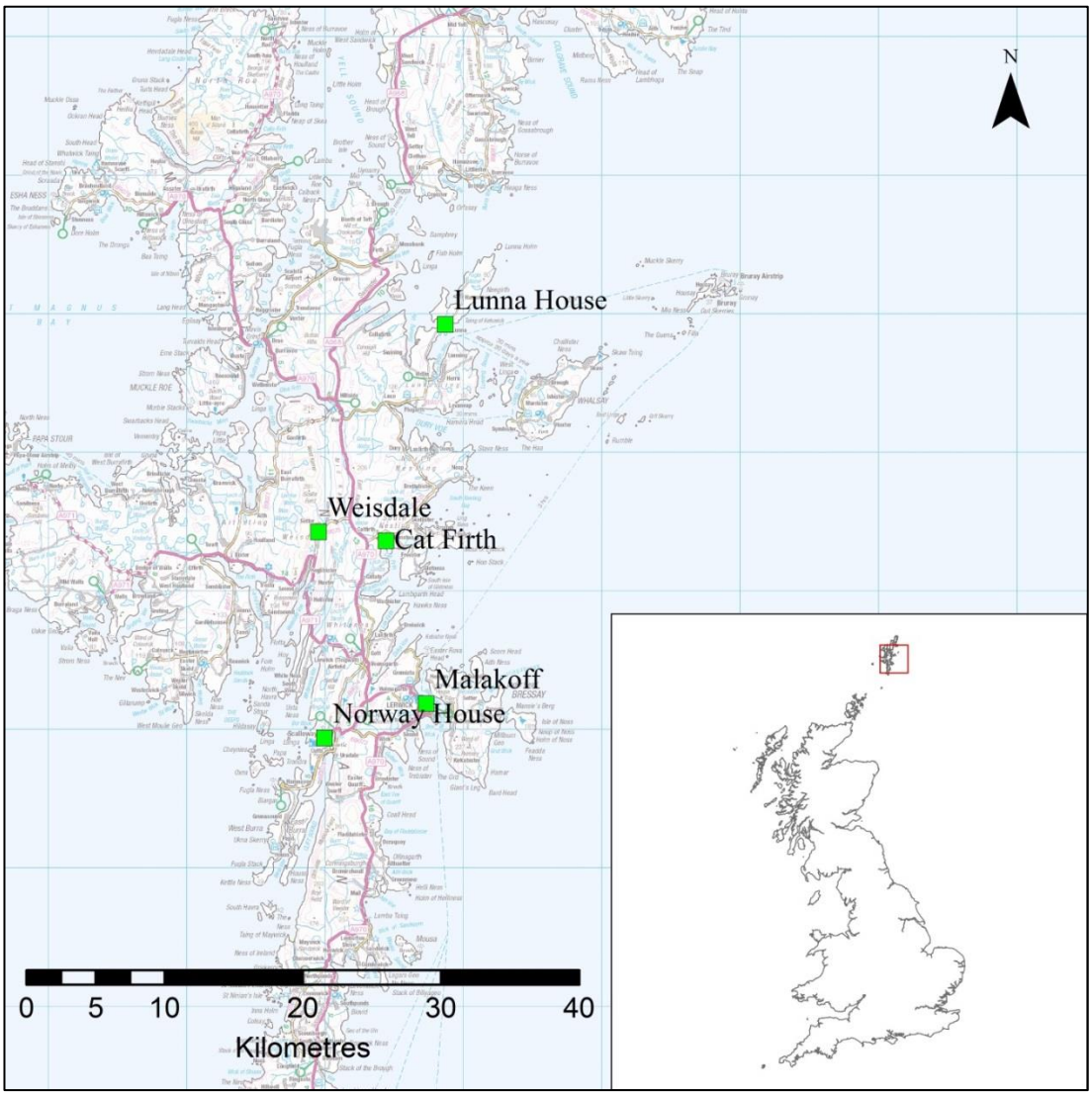

Figure 84: The Shetland Islands, home to the Shetland Bus. As the organisation's activities became common knowledge amongst the local population, they could no longer be regarded as clandestine. Physical segregation was, therefore, no longer a determining factor in siting their facilities. The shore establishment, therefore, relocated to Scalloway.

SOE's first shore establishment on the Shetland Islands was located at Lunna House on Lunna Voe (*Figure 85*). The physical isolation of this site was intended to

[21] TNA HS 7/174 History of the Norwegian Section 1940-1945 p. 43. No further information about the Burghead base is known. There is no reference to this facility in any secondary literature and the author found no further primary documents associated with the base.

restrict the number of people who were aware of the activities of the Norwegian sailors.[22] Lunna Voe also offered SOE a natural harbour sheltered from both the Atlantic Ocean and the North Sea.

Figure 85: Lunna Voe, the first home of the Shetland Bus. It was from here that Norwegian fishermen crossed the North Sea to deliver agents and supplies and bring back refugees.

Overtime, the security provided by Lunna Voe's isolation proved counterproductive and began impacting the flotilla's operational efficiency. The Shetland's small population meant that the activities of the crews rapidly became public. Their operations also became common knowledge within Norway by both Norwegians and Germans alike.[23] Eventually being christened the 'Shetland Bus', physical isolation was no longer a necessary security precaution. It was now only essential to protect knowledge of the nature and destination of operations.[24] If these were compromised, the success of missions and the safety of SOE's agents could be undermined.

It soon became apparent that the physical isolation of the shore facility was having a negative impact on SOE's operations. Access to the site was only possible

[22] David Howarth, *The Shetland Bus: A Classic Story of Secret Wartime Missions across the North Sea* (Lerwick, 2010) p. 88
[23] For a detailed history of the Shetland Bus see David Howarth, *The Shetland Bus* and Kaare Iversen, *Shetland Bus Man*.
[24] David Howarth, *The Shetland Bus* pp. 88-9

by a single road constructed on peat. Over the winter months, this was prone to subside under the weight of the lorries resupplying the facility. Lunna Voe's isolation also impacted the opportunities for rest and relaxation.[25] Without the ability to keep the crews occupied, entertained and relaxed whilst off duty, the operational efficiency of the establishment would deteriorate with a decline in morale.

Physical isolation also restricted the capability of SOE's shipwrights to access the islands' engineering facilities. If ships were to be maintained and repaired at Lunna Voe, the organisation would have to be willing to provide the necessary infrastructure. The engineers would still, however, require a stockpile of equipment and materials essential to their work. Construction of workshops would have also made the facility more conspicuous to aerial reconnaissance.[26]

In 1942, following a visit to Lunna Voe by Colonel John Wilson, head of the Norwegian Section, it was finally agreed that the 'advanced operational Base had proved [too] remote'.[27] Whilst the main activities of the Shetland Bus were to be relocated, accommodation at Lunna Voe was retained for the most secret type of operations.[28] SOE's shortlist of sites included Lerwick on the east coast and Scalloway on the west. Although security was no longer a primary factor, Lerwick was deemed too 'cosmopolitan'. The harbour and engineering facilities were also being fully utilised by the Royal Navy. SOE's final choice of Scalloway was also swayed by a maritime engineering firm offering them access to their workshops in the settlement.[29]

In order to conserve scarce resources, SOE preferred to utilise pre-existing structures. This also helped to conceal their activities from enemy reconnaissance. In order to operate efficiently, numerous buildings in Scalloway had to be requisitioned. Shipwrights' workshops, storage facilities, a sergeants' mess and a radio workshop were accommodated in two condemned houses, a disused coal store, an old weaving shed and a herring-curing station. To billet the staff, an old net factory was converted into barracks and four Nissen huts were constructed. The cipher staff and intelligence records were located in a rented property on the main street. Behind the settlement, SOE acquired a range of wooden huts which were used

[25] David Howarth, *The Shetland Bus* pp. 88-9
[26] Ibid pp. 88-9
[27] TNA HS 7/174 Chapter 1942 p. 40
[28] Ibid p. 40
[29] David Howarth, *The Shetland Bus* pp. 88-9

to accommodate the British staff and an officers' mess. As the number of Norwegian officers started to increase, an empty hotel was used for their accommodation. Further properties also housed the Motor Transport (MT) workshop, the armourer and storage facilities.[30]

At the time the Shetland Bus moved from Lunna Voe to Scalloway, only one slipway existed on the islands. As this was regularly employed by the Royal Navy, it proved difficult for SOE to arrange access to this facility. To overcome this issue, SOE decided to construct a second slipway. Initially, it was intended that the Admiralty would build this new facility on their behalf. When it became obvious that construction would not start before the winter, SOE sought permission to undertake the work themselves. Agreement was duly received and £750 was allocated to the task.[31] This internalisation of building work mirrored the establishment of the MCU on the mainland.

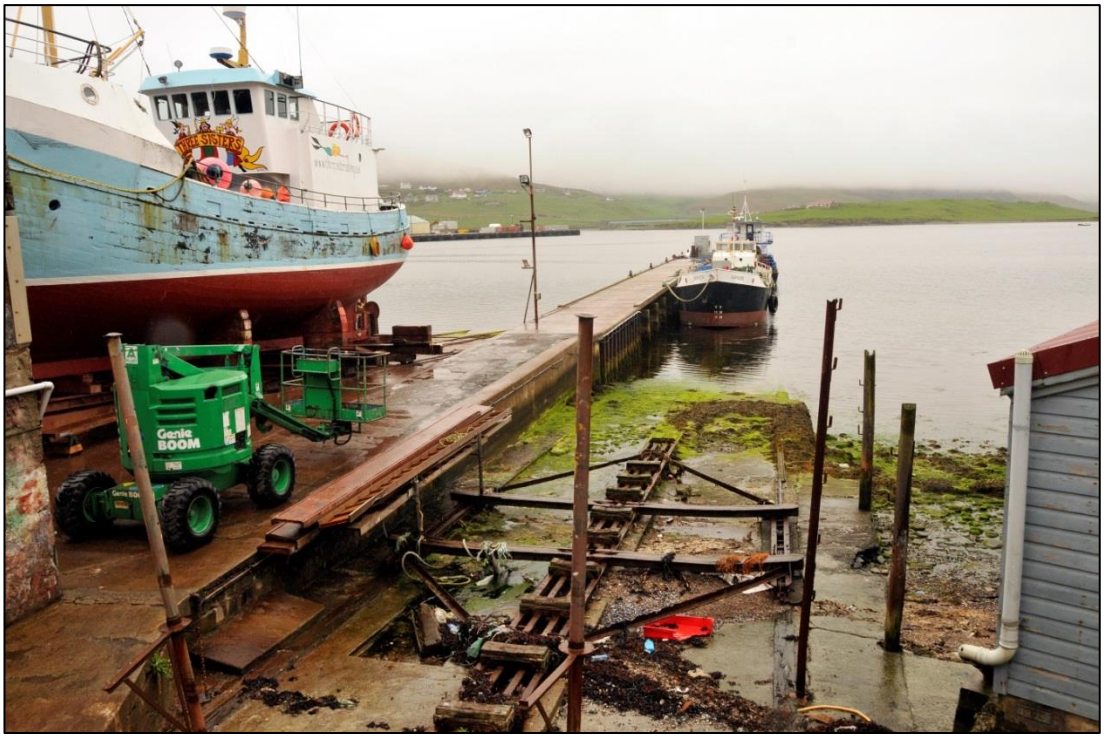

Figure 86: Prince Olav's slipway (to the right of the pier), named after the Crown Prince of Norway, Scalloway, Shetland. Constructed by the inexperienced staff of the Shetland Bus, the slipway is still in use today by fishing boats.

[30] David Howarth, *The Shetland Bus* pp. 95-6
[31] Ibid pp. 95-6

One of the main challenges faced by the Shetland Bus was their lack of experience constructing slipways. They were also reluctant to ask for any additional resources. In an effort to keep costs down, material and resources were scavenged.[32] Once all the necessary equipment was collected, Royal Navy divers were employed to install the concrete ramp which descended 170ft (51.82m). Completed in just two months, the 'Prince Olav' Slipway had the capabilities to winch vessels of 110ft (33.53m) length and with a dead weight of 120 tons (*Figure 86*).[33] Despite the Admiralty's initial reluctance to construct the slipway, without their support this structure could not have been built.

On completion of the Prince Olav Slipway, work began on the next engineering project, construction of a new pier. This structure was also erected with limited resources and no previous experience. To install the foundations, a pile-driver was manufactured from a disused army water tower. In an effort to speed up construction, the decision was taken to weld the pier together.[34] Admiralty approval for the building of a slipway and pier reflected the senior service's tolerance of SOE operations within the North Sea. The extent of the operational area ensured that the activities of the Shetland Bus were unlikely to impact the Royal Navy. Operations by a clandestine fleet within the North Sea would most likely be combated by coastal patrols. As these would not extend far into open water, the ships of the Royal Navy could continue with their missions unimpeded. Conflict between SOE and the other services normally occurred when their clandestine activities were seen to have a negative impact on the latter's operational capabilities.

In the small community of the Shetland Islands, the activities of SOE could not be shielded from public knowledge. As the organisation could no longer be classified as clandestine within this landscape, physical isolation was no longer relevant. It was, however, essential that certain operational information remained concealed from the general public.

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[32] The winch was found discarded on Fair Isle, an engine was removed from a wrecked fishing boat and the tracks came from Aberdeen. Unlike the slipways constructed for Operation OVERLORD (John Schofield, 'D-Day Sites in England: An Assessment', *Antiquity*, 75 (2001) p. 80), SOE's slipway was of a primitive design.

[33] David Howarth, *The Shetland Bus* pp. 95-6. Despite their lack of resources and experience, the staff of the Shetland Bus were able to construct a slipway which has withstood the passing of time.

[34] David Howarth, *The Shetland Bus* pp. 95-6. At the time, it was probably the only welded pier in existence. Similarly to Prince Olav Slipway, this structure still survives and is in daily use by local fishermen.

The Operational Challenges of Clandestine Flotillas

The very nature of maritime links with the continent impacted SOE's operational capabilities. Supplies and agents could only be delivered to an unguarded stretch of shoreline. Although the rugged nature of the Brittany coast was ideal for clandestine activities, it was not safe to beach SOE's ships. It was, therefore, necessary to transfer stores to purposely designed surf-boats.[35] This procedure could take in excess of one and a half hours to complete which increased their risk of discovery.[36]

It also became apparent that supplying the resistance within Europe from the Brittany coast was impractical. Stores, often of a bulkly and compromising nature, would have to be transported across enemy controlled country to their intended destination. Patrols, curfews and checkpoints exacerbated the unnecessary risk faced by those tasked with moving the supplies.[37] Further restrictions to clandestine maritime activities occurred on 23 March 1942 when Hitler issued the *Kustenverteidigung,* Coastal Defence Directive 40. This Directive gave rise to the Atlantic Wall and the increasing militarisation of the north European coastline.[38] It soon became apparent that SOE required a form of transportation which could deliver material to pinpoint locations deep within occupied Europe (*Figure 87*). The obvious solution was the RAF.

[35] The Motor Torpedo Boats (MTBs), which were sometimes employed on these operations, could only carry two surf-boats which each supported six passengers. In bad weather, the number of passengers in each boat was severely restricted.
[36] Brook Richards, *Secret Flotillas* pp. 197, 250, 263
[37] TNA AIR 20/8242 SOE Air Operations 23/02/1943 p. 1
[38] George Forty, *Fortress Europe: Hitler's Atlantic Wall* (Hersham, 2002) p. 12

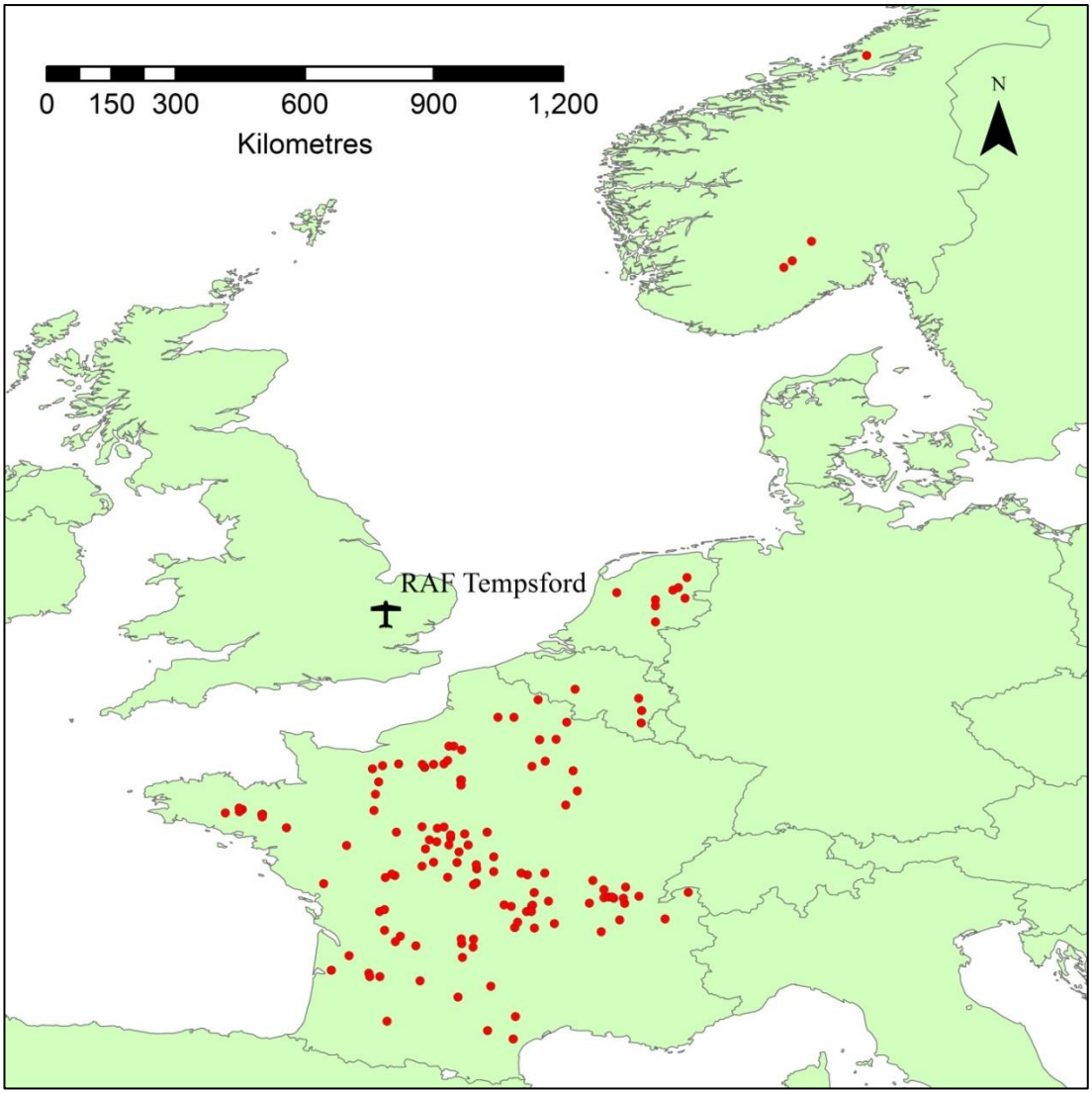

Figure 87: This map is a composite of the locations of drop zones (DZs) the RAF delivered supplies to between 26 February 1943 and 22 June 1943. Unlike the Helford Flotilla, the RAF could transport SOE's stores and agents deep into the heart of occupied Europe. This meant that equipment arrived at its intended field of operation without having to be moved across enemy control territory.[39]

Airborne Operations

Following the Fall of France in June 1940, the spare capacity of the poorly equipped RAF was severely impacted.[40] Support for clandestine activities was, therefore, not forthcoming. Air Marshal Arthur 'Bomber' Harris, of Bomber

[39] TNA AIR 20/8297
[40] Immediately following the Fall of France, the RAF was fighting for survival in the Battle of Britain.

Command, was of the belief that the war could only be won through strategic bombing.[41] This command regarded clandestine warfare as 'unethical'[42] and felt that it was 'an unworthy and inexcusable travesty of our conduct of the war to suggest that our policy is determined [by SOE]'.[43] Harris also viewed SOE's parent ministry, the Ministry for Economic Warfare (MEW), as 'amateurish, ignorant, irresponsible and mendacious'.[44]

On 21 August 1940, the RAF reluctantly released aircraft to form 419 (Special Duties) Flight at North Weald airfield, Essex.[45] The following year on 1 March, the RAF disbanded the flight and it was reformed as 1419 (Special Duties) Flight at RAF Stradishall, Suffolk.[46] Two months later, on 16 May, Harris complained that 'only a short while ago strenuous political manoeuvres took place which resulted in our being bullied, quite unnecessarily, into raising the establishment of this flight in aircraft and crews'.[47] Under this pressure, further aircraft were provided and on 25 August 1941, 1419 (Special Duties) Flight was disbanded and reformed as 138 Squadron.[48] On 15 February 1942, the number of aircraft allotted to the Secret Services increased further with the formation of 161 Squadron.[49]

Despite the RAF giving into political pressure, Harris remained vocal in his objections.[50] Believing that the 'present system of specialising squadrons in extraordinarily wasteful and diametrically opposed to our theory of versatility and economy … I [Harris] will, accordingly, if these squadrons are returned to me or traded off in lieu of other of my squadrons to Coastal Command, undertake all reasonable requirements now undertaken or foreshadowed by 138, provided they are

[41] Richard Muller, 'The Origins of MAD: A Short History of City-Busting' in: *Getting MAD: Nuclear Mutual Assured Destruction, Its Origins and Practice*, (ed) Henry Sokolski (Carlisle, 2004) p. 36
[42] Boye Lillerud, '"Flipping the COIN": Unity of Effort and Special Operations Forces', *Security in Practice* 16.752 (2008) p. 20
[43] Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany 1939-1945* Vol. 3 (London, 1961) p. 88
[44] Ibid p. 88
[45] Whether this was a result of external pressure of an internal change of policy is uncertain. The formation of this 'Special Duties' was to provide transportation for agents and supplies on behalf of the Secret Services.
[46] Alan Lake, *Flying Units of the RAF: The Ancestry, Formation and Disbandment of all Flying Units from 1912* (Shrewsbury, 1999) p. 84
[47] TNA AIR 2/5203 Minute Sheet 16/05/41
[48] Jeff Jefford, *RAF Squadrons: A comprehensive record of the movement of all RAF squadrons and their antecedents since 1912* (Shrewsbury, 2001) p. 63
[49] Alan Lake, *Flying Units of the RAF* p. 233
[50] TNA AIR 20/2901 ATH/DO/6 28/03/1942 p. 1

reasonable'.[51] In exchange for the disbandment of the Special Duty Squadrons, Harris offered to provide the Secret Services transportation on the understanding that he retained authority to refuse missions. Despite the RAF's reluctance to support clandestine activities, from January 1941 the number of supply operations conducted by aircraft far exceeded those by ships (*Figure 88*). The loss of the Helford Flotilla in 1942 would, therefore, have had little impact on SOE's operational capacity.

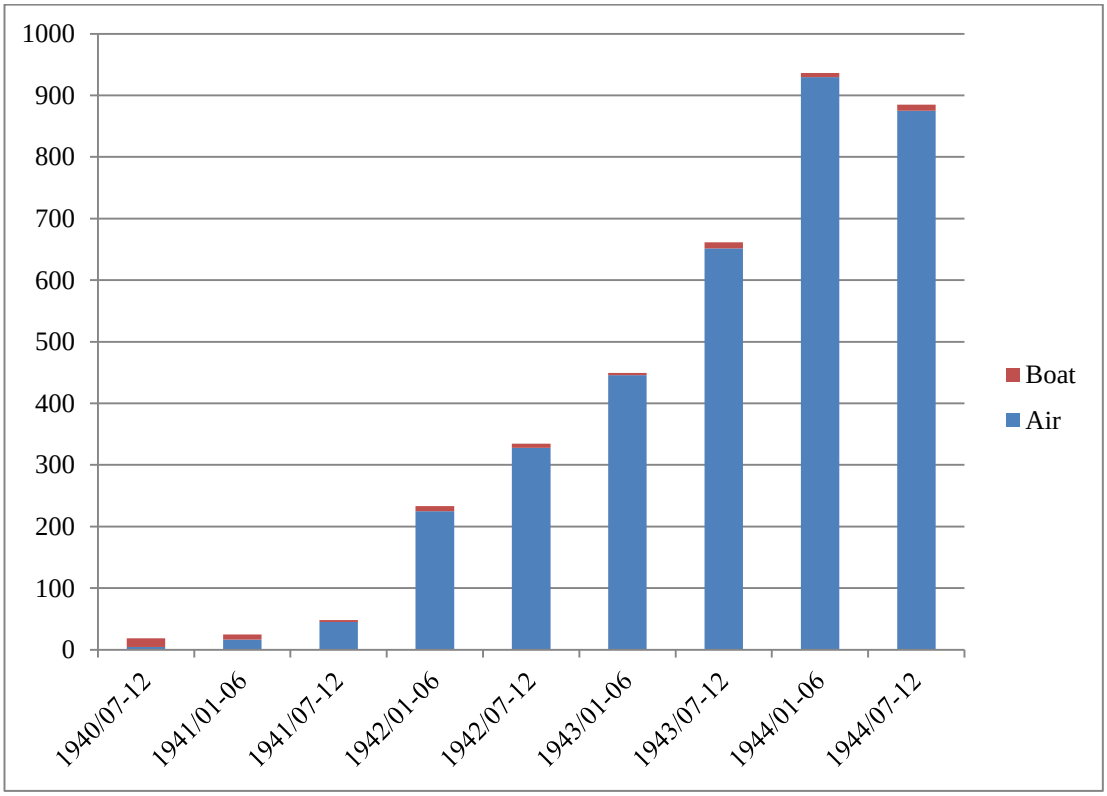

Figure 88: Comparison of the number of sorties undertaken for SOE by air and sea networks from July 1940 to December 1944. The data clearly shows that maritime links played an insignificant role in SOE's supply chain from January 1941. This comparison only takes into account the Helford Flotilla, the operations undertaken by the Shetland Bus are not included. These operations would, however, have little impact on the data comparison.[52]

[51] TNA AIR 20/2901 ATH/DO/6 28/03/1942 p. 1
[52] Based on TNA AIR 20/8255, TNA AIR 20/8334, TNA AIR 20/8343, TNA AIR 20/8252 and Brook Richards, *Secret Flotillas*

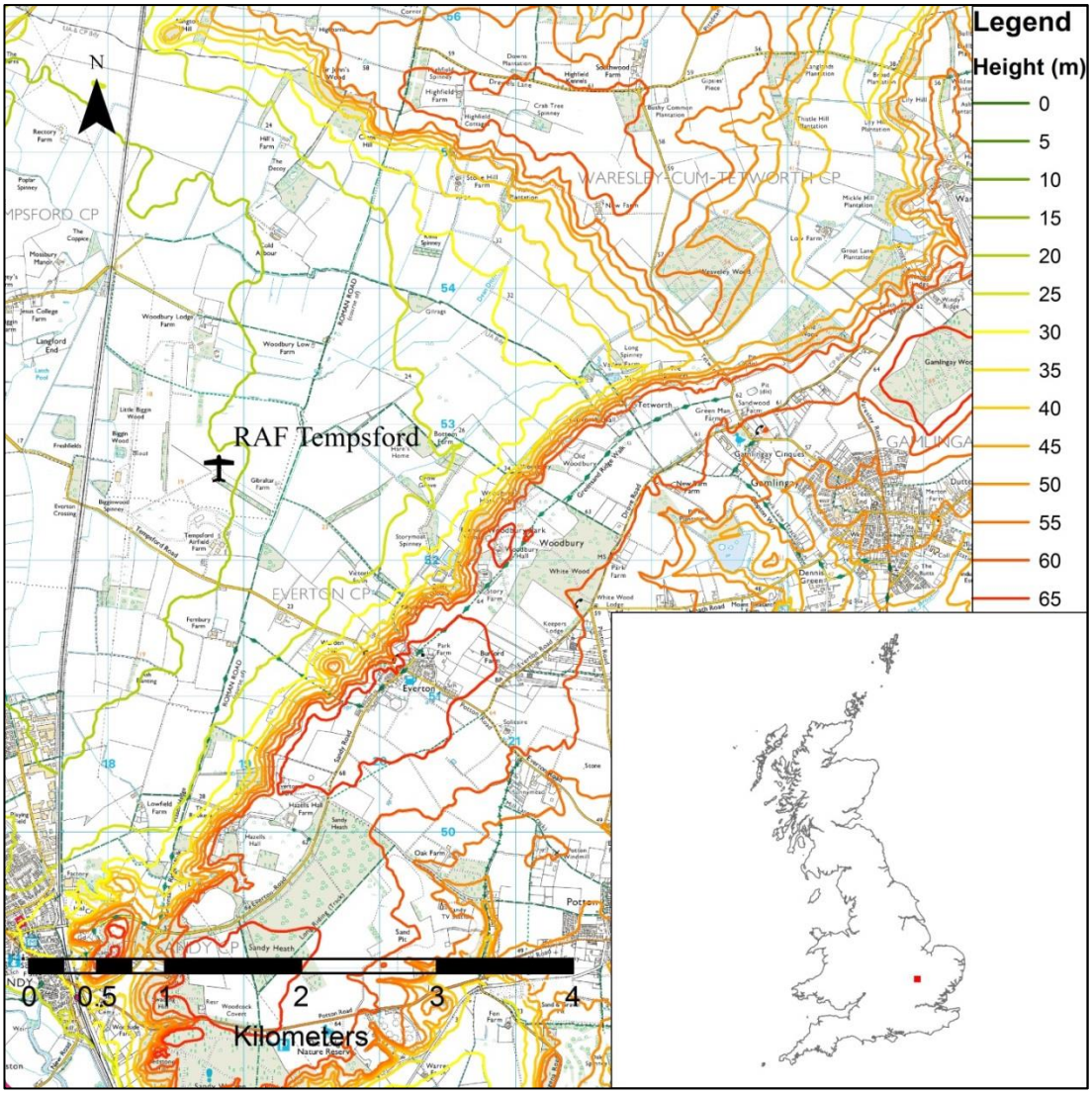

Figure 89: RAF Tempsford was located on a low-lying marsh land which was liable to flood. This was a far from an ideal location to locate an airfield. To the south-east and north-east, topographical ridges restricted the ability of fully loaded bombers from taking off. The airfield was also overlooked to the west by the main railway line between London and Edinburgh and to the east the Great North Road

With the increasing number of aircraft available to the Secret from 1942, it was deemed appropriate that these units should be provided with their own airfield.[53] Eventually the RAF settled on accommodating 138 and 161 Squadrons at RAF Tempsford. Despite operated in support of the Secret Services, this facility retained the capacity to undertake bombing missions. An important factor in the allocation of

[53] TNA AIR 14/1211 RAF Station Tempsford 3G/S8730/29/Org 24/03/1942

this airfield to 138 and 161 Squadrons was its 'substandard' nature.[54] Contemporary airfields were constructed in areas taking into account soil type, drainage, obstructions to flying and access to local hardcore and brick supplies.[55] Although not all criteria could be met, '[t]o the greatest extent possible, the location and design for a facility must provide the best response to all requirements'.[56]

Located in the bottom of a valley on heavy soils, RAF Tempsford was prone to flooding and fog (*Figure 89*). To the south-east and north-east of the airfield, high ground restricted the approach of aircraft. Contemporaries had also raised concerns that some of the runways were unserviceable to fully laden bombers during take-off.[57] Questions began to be broached as to whether 138 Squadron should move to the airfield after the RAF had 'condemned Tempsford as far as their own Squadrons are concerned'.[58] Overall, the facility was regarded as a 'poor airfield'.[59]

Political pressure from the end of 1941 'bullied' the RAF into increasing their capacity to support the Secret Services. From the prospect of the RAF, Tempsford was the ideal airfield to allocate to 138 and 161 Squadrons. By assigning this facility to support the clandestine war effort, they managed to meet their obligations whilst limiting the impact on their operational capabilities.

The Nature of RAF Tempsford[60]

Despite SOE's objections to RAF Tempsford, 138 Squadron relocated there on 11 March 1942 followed by 161 Squadron in April.[61] During construction, allocation of this facility to the two Special Duties Squadrons had yet to be agreed. Tempsford was, therefore, designed as a standard bomber airfield. Initially

[54] As the RAF were reluctant to support these squadrons, they were unlikely to provide them access to an inter-war, resource heavy facility.
[55] David Smith, *Britain's Military Airfields 1939-45* (Wellingborough, 1989) p. 46
[56] Department of the Army and Department of the Air Force, *FM 5-430-00-1* (Washington, 1994) p. 2-1
[57] TNA AIR 14/1120 JEAB/DO/90 20/01/1942 p. 2
[58] TNA AIR 20/8343 GC Ops 06/09/1941
[59] TNA AIR 14/1120 ACASI/38A/42 p. 1
[60] In preparation for Operational OVERLORD, No. 38 Group was allocated the task of supporting the activities of 138 and 161 Squadron in supplying the resistance. Those sorties conducted by this group were all flown from their existing airfields. This indicates that no specific infrastructure was required. There were, however, complaints over the quality of the operations aircraft from this group undertook (TNA HS 7/161 Evaluation of SOE Operations in Holland p. 5).
[61] Jeff Jefford, *RAF Squadrons* pp. 63, 66

constructed with four T2 type hangars,[62] by the end of 1942 a further B1 type hangar had been erected to the south of the site. In 1943, another two T2 hangars were constructed to the north.[63] The airfield was also provided with 47 pan hardstandings and four Blister hangars.[64]

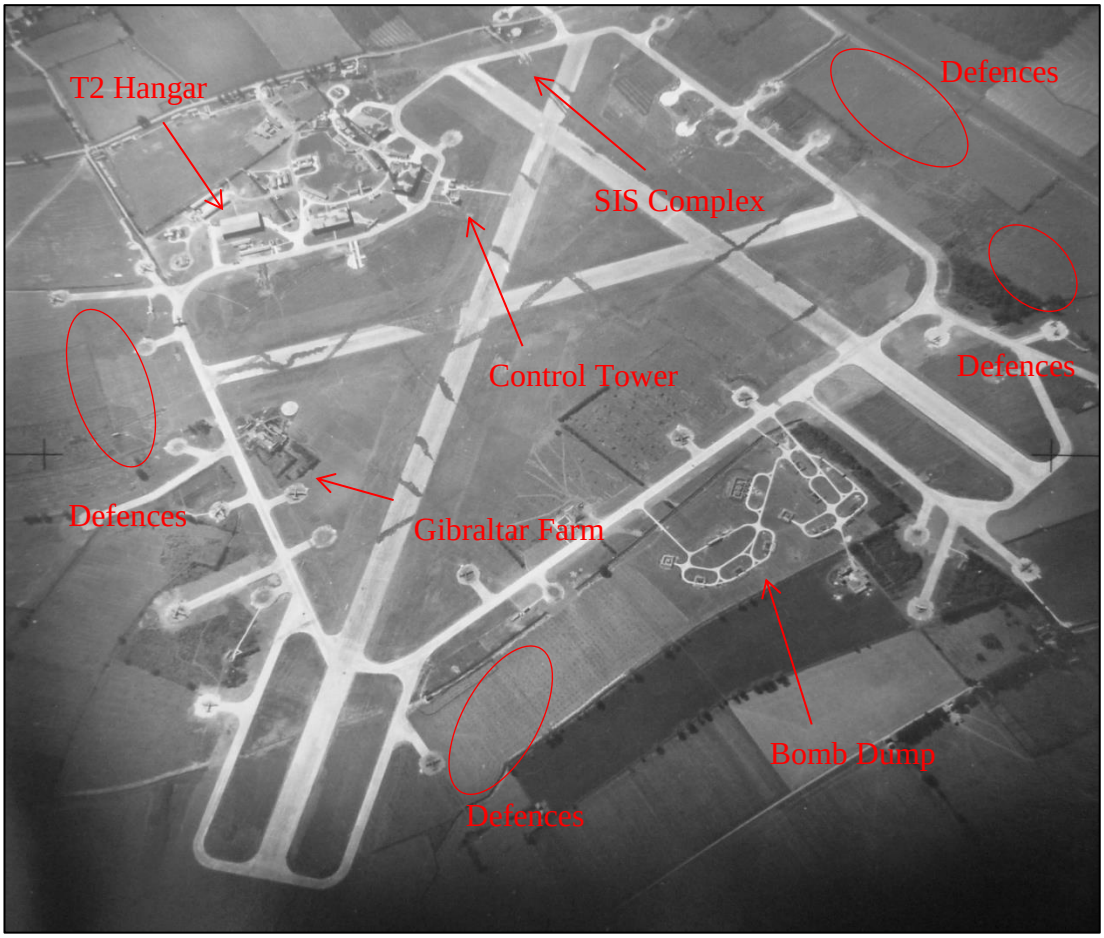

Figure 90: RAF Tempsford in September 1942.[65]

Although the extensive infrastructure at RAF Tempford was atypical, it was not uncommon for contemporary bomber airfields. For the date of construction, the presence of four T2 type hangars was in keeping with Air Ministry policy. Following its allocation as a Special Duties airfield, the number of large hangars increased to

[62] In 1942, the Air Ministry reaffirmed their intention of providing four T2 type hangars on bomber airfields (Roger Freeman, *The Mighty Eighth War Manual* (London, 2001) p. 267).
[63] The seven hangars at RAF Tempsford were almost double the number expected on a bomber airfield.
[64] The main satellite airfield for 138 and 161 Squadrons was RAF Tangmere, West Sussex. This was also home to 11 Group Fighter Command and 84 Group 2 Tactical Air Force (TAF) (Jonathon Falconer, *RAF Airfields of World War 2* (Hersham, 2012) pp. 187-9).
[65] English Heritage FNO/141 8OTU 08/09/1942 3

seven. At the time, only airfields which had been appointed a unique function displayed uncharacteristic infrastructure.[66]

In an attempt to disguise RAF Temspford, an unusual and potentially counterproductive camouflage scheme was devised. This was developed by Major Jasper Maskeyne and the Royal Engineers' Camouflage Experimental Station. In order to disguise the airfield, roof slates were removed from buildings, windows were deliberately broken, curtains were replaced with sacks and buildings were clad in wood to make them resemble stables.[67] In keeping with contemporary camouflage schemes, paint was used to break up the outline of the runway (*Figure 90*). The overall effect of this scheme was to give RAF Tempsford the appearance of a disused airfield.[68] On arriving at this facility for the first time in 1942, Jack Tickell records that:

> 'this must be some elaborate leg-pull for, at a glance, the whole place looked derelict. There was a huddle of buildings roughly the shape and size of Nissen huts but they looked like cowsheds, but I didn't know that until much later. They were grouped round a farm. Its name was Gibraltar Farm. … There were some hangars, so superbly camouflaged that it took me quite a time to realise that they were hangars … There were runways, strangely narrow ones channelled out of fields of vegetables. You hardly noticed them. The whole place was odd. Not exactly up to standard … Gibraltar was a real farm. No doubt about that. But instead of land-girls … there were more guards hanging around the muckyards and there was a duck-pond'.[69]

[66] At RAF Foulsham, Norfolk, ten hangars were constructed over the course of the Second World War. Five of these, however, were specifically erected for the Horsa Gliders which were involved in Operation OVERLORD (Jonathon Falconer, *RAF Airfields of World War 2*).
[67] Bernard O'Connor, *RAF Tempsford: Churchill's Most Secret Airfield* (Stroud, 2010) p. 19
[68] Ibid p. 19
[69] Ibid pp. 196-7

Figure 91: Running along the western edge of RAF Tempsford was the Great Northern Railway line. This was the main link between London and Edinburgh. All passengers travelling along this line would potentially have been aware of the active airfield at Tempsford.[70]

The extent and attention to detail of RAF Tempsford's camouflage scheme appears superfluous. At the height at which the Luftwaffe reconnaissance pilots were flying, Maskeyne's minor architectural features would have been invisible. As the airfield was active, there would have been unavoidable signs of human occupation. Pathways, tyre marks and aircraft on hardstandings would have been identified by aerial photographic interpreters.[71] The scheme was, therefore, designed for another

[70] English Heritage 106G/UK/969 01/11/1945 4116
[71] RAF Tempsford was home to two active squadrons and 2,092 personnel (Bernard O'Connor, *RAF Tempsford* p. 198). Regular sorties from the airfield would have left clear indications that the facility was still active.

target audience. Tickell's impression of RAF Tempsford illustrates that the camouflage was designed to disguise the airfield from ground based reconnaissance.[72]

Disguising RAF Tempsford from the ground was a necessary requirement. Running along the western boundary of the airfield was the Great Northern Railway. This was the main line connecting London to Edinburgh (*Figure 91*). It was possible that any passenger travelling this route could briefly observe the airfield. In 1942, the Officer Commanding 'A' Flight of 161 Squadron was on the train and overheard a 'Small boy [say] to [his] mother: "Oh, look Mummy. There's a torpedo on that black Lysander". Young man: "That's not a torpedo. That is a long range petrol tank. I wonder what they use them for". In view of this conversation, and the possibility of an enemy agent being a passenger in one of the 300 trains which pass each day, I thought it advisable to bring this to your attention'.[73] Camouflage was, therefore, essential at RAF Tempsford. The overt nature of the scheme at the airfield was partly designed to hide the daily activities of the facility from passengers on the train.

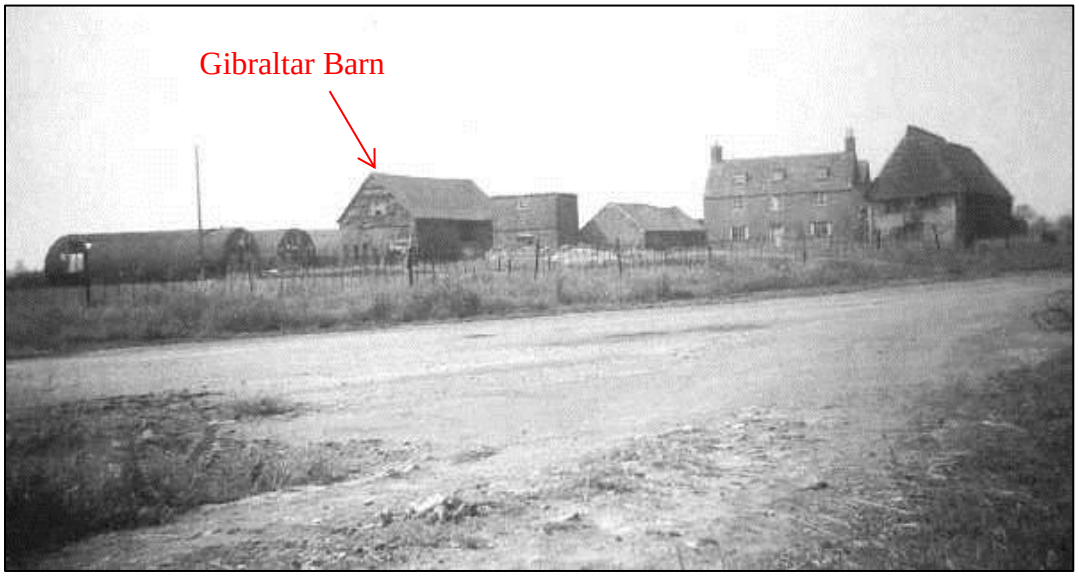

Figure 92: Gibraltar Farm, Tempsford, home to SOE's operational centre. In order to camouflage the airfield, it was made to look like a disused facility which had reverted back to agricultural uses.[74]

[72] Despite all these efforts to camouflage RAF Tempsford, the airfield received public recognition on 9 November 1943 when King George VI and Queen Elizabeth paid an unofficial visit. Although its location was undisclosed, the visit was reported in the local newspaper (Bernard O'Connor, *RAF Tempsford* p. 212).[72]
[73] TNA AIR 40/2579 Security 22/07/1942
[74] Harrington Museum

Whilst the airfield at Tempsford was being constructed, it was decided to retain the pre-existing farm buildings located within the perimeter track. Although this was atypical, it was not uncommon.[75] On the 1944 plan of the site, this complex, known as Gibraltar Farm, was allocated to 'special duties'.[76] The function of these buildings was to act as SOE's control centre on the airfield (*Figure 92*). Here, the organisation stored its maps, plans and records of operations.[77]

Figure 93: Inside Gibraltar Barn, agents would undergo a series of rigorous final checks to ensure they were not carrying any compromising material on their person.

Within this complex was Gibraltar Barn. Inside this timber framed structure, brick shelving was constructed on which agents' equipment could be stored (*Figure 93*). On arriving at the airfield in a blacked out car, agents would be driven to the barn for final checks. It was here that they ensured that they had all their equipment and any compromising material had been removed from their person. As the

[75] Of the 62 airfields operated by the USAAF 8th Air Force, only six retained pre-existing structures within their perimeter tracks (Roger Freeman, *The Mighty Eighth War Manual* pp. 273-304).
[76] RAF Museum Tempsford Record Site Plan DGW 4330/44
[77] Bernard O'Connor, *RAF Tempsford* pp. 19, 49, 60

activities which occurred in this barn were highly secret, only a select group of personnel were allowed within this structure.[78]

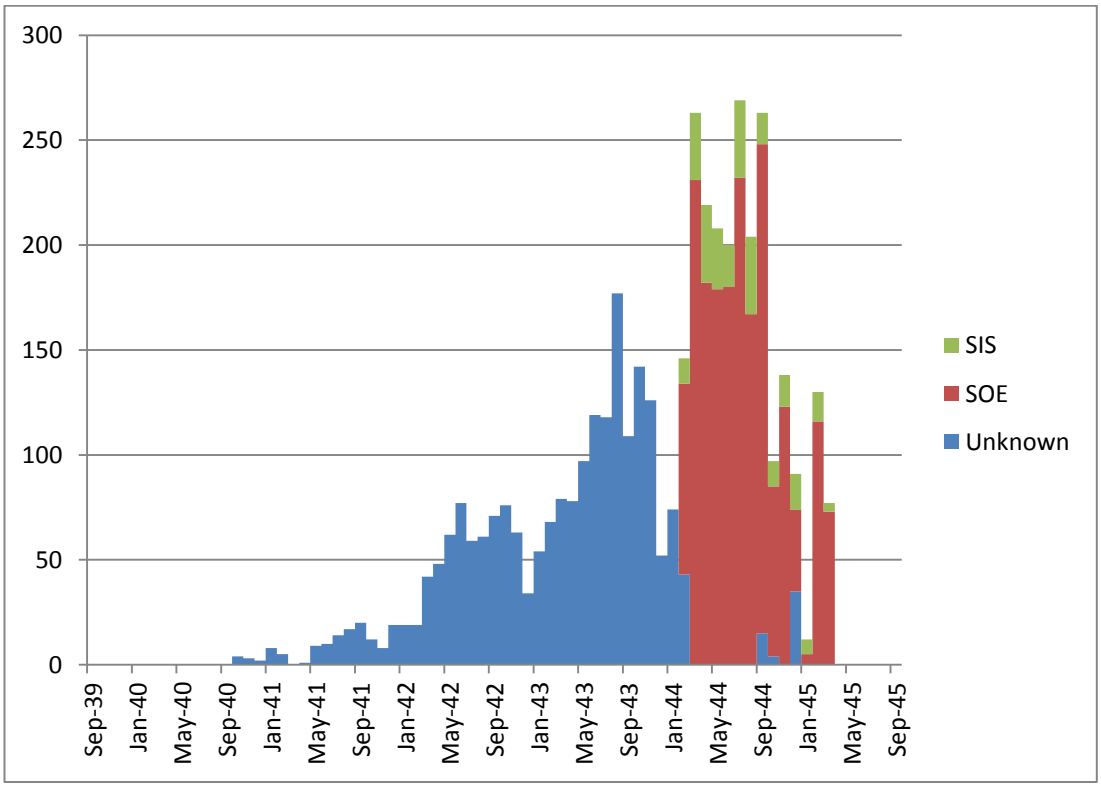

Figure 94: The monthly number of sorties conducted by 138 and 161 Squadrons and their predecessors.[79] From January 1942 there is a clear expansion in the RAF's capacity in supporting the Secret Services. This gradually increases until Operation OVERLORD.

SOE's utilisation of Gibraltar Farm reflected their relationship with the RAF. By 1942, all discussion between SOE and the Air Ministry had to be conducted through the latter's Intelligence Directorate, AI2(c).[80] All plans made by SOE had to be 'submitted at a monthly conference with D.D.I.2 [Deputy Director of Intelligence responsible for Europe], at which the O/C. [Officer Commanding] 138 Squadron is present. In practice it is the Squadron who decide whether a specific operation can be undertaken or not … [On the day of the sortie the] Squadron decide which operations are possible on the 12 o'clock (and sometimes even the 2 o'clock) Met. Reports'.[81]

[78] Bernard O'Connor, *RAF Tempsford* pp. 19, 49, 60
[79] Based on TNA AIR 20/8255, TNA AIR 20/8334, TNA AIR 20/8343 and TNA AIR 20/8252.
[80] TNA HS 4/143 Air Policy 06/04/1942 p. 1
[81] Ibid pp. 1, 2

The late decision inevitably meant there was little time available for SOE to prepare agents and equipment ready for despatch.[82] Sorties from RAF Tempsford were clearly not collaboratively planned. Despite sharing the same airfield, the two organisations appear to have operated in isolation. This was reflected by the physical segregation of their personnel on site.

The two Special Duties Squadrons based at RAF Tempsford also undertook mission on behalf of SIS (*Figure 94*). It was, therefore, essential that this organisation was provided with facilities at the site. Located on the airfield's perimeter track, was another complex of buildings classified as 'special duties' on the 1944 site plan. It is likely that these structures accommodated SIS personnel (*Figure 95*). The segregation of SOE, SIS and the RAF on the same airfield could only have led to mutual distrust.

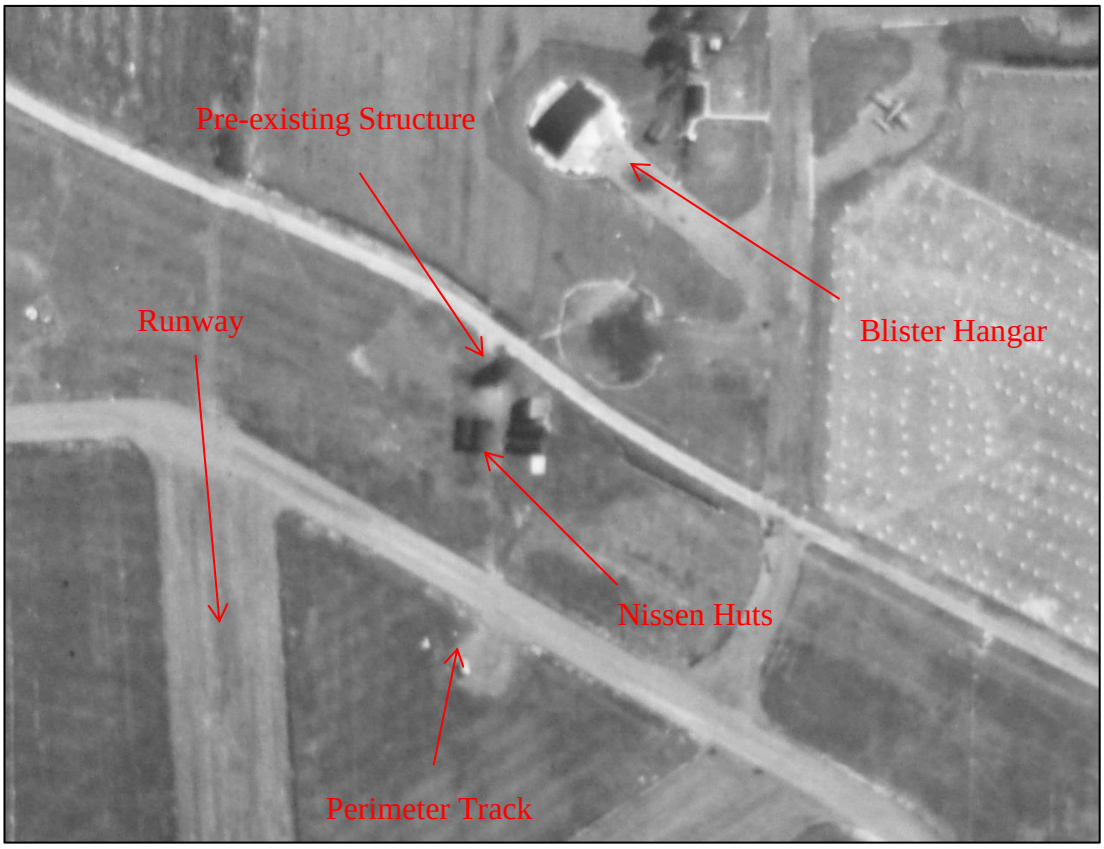

Figure 95: The pre-existing structure to the east of RAF Tempsford was probably used by SIS. To increase the space of this facility, four nissen huts were also constructed.[83]

[82] TNA HS 4/143 Air Policy 06/04/1942 p. 2
[83] English Heritage 106G/UK/635 10/08/1945 3431

The physical security of RAF Tempsford, in common with other facilities operated by SOE, was of secondary importance. Sites were often protected by not drawing attention to themselves. If SOE's facilities could blend into the wider militarised landscape, fewer questions might be asked by the local population. This meant access to the airfield was relatively unimpeded (*Figure 90*). It is recorded locally that a group of teenagers managed to enter the facility through woodland. They were only apprehended after they had climbed into the cockpits of several aircraft.[84] By not establishing excessive security measures, it was hoped that the nature of the airfield could be disguised.

Figure 96: RAF Tempsford's bomb dump. This facility was standard infrastructure for any bomber airfield during the Second World War.[85]

To the west of the site, the RAF established a bomb dump (*Figure 96*). Construction of this complex was completed in April 1942 at approximately the same time the airfield welcomed 161 Squadron.[86] By providing RAF Tempsford with a bomb dump, the two Special Duties Squadrons maintained an operational

[84] Bernard O'Connor, *RAF Tempsford* p. 199
[85] English Heritage 106G/UK/635 10/08/1945 3429
[86] TNA AIR 28/820 Operations Record Book April 1942 p. 2

capability to undertake strategic bombing. Despite providing the necessary infrastructure for raids, these squadrons could have undertaken more operations if the agreement procedure 'for these two units were less cumbersome'.[87]

	16/03/42 – 14/04/42	**15/04/42 – 14/05/42**	**15/05/42 – 14/06/42**	**15/06/42 – 13/07/42**
Passengers – down	50	41	23	21
Passengers – up	4	3	4	-
Packages – down	15	33	14	7
Packages – up	-	-	7	-
Containers – down	44	74	74	68
Pigeons – down	25	71	136	196
Nicklels – down (leaflets)	20,000	660,000	7,690,000	7,700,000
Bombs – down (lbs)	-	10,500	27,500	44,000
Incendiaries – down (lbs)	-	-	-	8,640
Sorties – Halifaxes	8	11	12	11
Sorties – Whitleys	32	34	47	47
Sorties – Lysanders	2	3	3	19
Total Operational Hours Flown	314	401.35	325.55	374.40

Table 17: Summary of work carried out by 138 and 161 Squadrons during the moon periods between March 1942 and July 1942.[88] Over this period, the greatest number of sorties were undertaken by the squadrons Whitleys. These aircraft were of inter-war vintage and were being withdrawn from front line service. It is also clear that bombing missions and the dropping of leaflets were important secondary tasks of these two specialist squadrons.

[87] TNA AIR 20/8170 OB Ops 6598 22/07/42
[88] TNA AIR 20/8170 Summary of work carried out by 138 and 161 Squadrons during the moon periods

On ‘several occasions [prior to July 1942] a considerable number of aircraft [at RAF Tempsford] were ready to bomb and had been loaded with their bombs, but owing to the difficulties met by O.C. Tempsford in obtaining approval from the Group and Command, the operations had to be cancelled’.[89] Between March 1942 and July 1942, only 82,000lbs of bombs were dropped by aircraft operating from RAF Tempsford (*Table 17*). This was equivalent to six fully loaded Halifaxes.[90] The greatest barrier to these missions was Bomber Command who wanted ‘to know the intentions with regard to targets by 0930 hours in the morning [However] O.C. Tempsford does not necessarily know until later in the day whether or not he will have surplus aircraft available for bombing’.[91]

DDI2 and the Officer Commanding RAF Tempsford were keen that 138 and 161 Squadrons were employed on bombing operations outside of the moon period[92] although agreeing to this in principle, SOE’s Air Liaison Officer envisaged that the aircrews would specialise in low-level, pinpoint hit-and-run missions. These would suit their extensive experience of navigating by dead reckoning. SOE, however, expressed concerns that targets should be carefully selected to reduce the risk of aircraft loss. The organisation had, after all, invested heavily in the training of these aircrews.[93]

The allocation of RAF Tempsford to 138 and 161 Squadrons reflected the RAF’s reluctance in 1941 to support activities which impacted their strategic bombing objectives. Despite the compartmentalisation of the airfield and the restrictions this placed on collaborations, SOE were willing to allow the two Special Duties Squadrons to undertake pinpoint bombing raids. It was, however, the RAF’s inflexibility which limited the number of operations these aircrews flew outside of the moon period.

[89] TNA AIR 20/8170 OB Ops 6598 22/07/42
[90] Each Halifax could carry a maximum 13,000lbs of explosives (Kenneth Merrick, *Halifax: An Illustrated History of a Classic World War II Bomber* (London, 1980) p. 223).
[91] TNA AIR 20/8170 OB Ops 6598 22/07/42
[92] Ibid. The moon period provided the aircrews with greater visibility to locate their target.
[93] TNA AIR 20/8170 Special Targets for 138 and 161 Squadrons: Notes of meeting at Tempsford on the 12th July, 1942

SOE's Transportation Infrastructure: a European Lifeline

Over the course of the Second World War, SOE's transportation arrangements transformed from an ill-conceived response to an immediate problem to a highly professional service. Following the Fall of France in June 1940, the reestablishment of lines of communication with the country was of strategic importance to the Secret Services. On realising SIS regarded clandestine warfare as a low priority, SOE established an independent link with the Brittany coast. At the time, only 'two methods of transporting personnel and equipment to the field are open, by air or by sea' [94] As the RAF did not have the resources, or the inclination, to support SOE, a clandestine flotilla was the only option. Experience, combined with increasing political support, led the organisation to end its reliance on maritime links following the loss of the Helford Flotilla in 1942.[95]

Despite the operational advantages of using aircraft to transport agents and supplies, Harris and the RAF were reluctant to divert their scarce resources away from strategic bombing. It was only through political bullying that the number of aircraft available to the Secret Services increased. By 24 March 1943, however, the total strength 'in crews of four engine aircraft is 15 for 138 Squadron and 5 in 161 Squadron, that is 20 complete crews for 18 establishment aircraft. This is the equivalent of a normal operational Squadron'.[96] Initially, the aircraft released by Bomber Command were of an inter-war vintage which were being withdrawn from front line squadrons.[97]

Although political pressure directly led to an increase in the number of aircraft available to the Secret Services, SOE were not initially the intended recipient of this greater operational capacity. At the 287th War Cabinet meeting held on 14 August 1941, the Committee decided that 'sabotage should be generally directed in accordance with the bombing aim policy'.[98] More importantly, it was agreed that in view of the 'paramount importance of good intelligence, the provision of sorties for

[94] Clandestine maritime flotillas did meet the operational requirements of SOE in the example of the Shetland Bus. This network was to prove an effective and efficient form of transportation to occupied Norway. Strategically located on the Shetland Islands, the shore establishment gained acceptance from the Admiralty and demonstrated SOE's desire to be self-sufficient.
[95] TNA AIR 20/8242 SOE Air Transport Requirements 01/01/1942 p. 1
[96] TNA AIR 14/1121 3G/S.8009/59/SOA 24/03/43
[97] Jeff Jefford, *RAF Squadrons* pp. 63, 66
[98] TNA CAB 79/13 287th Meeting War Cabinet 14/08/41

SO2 should not be allowed to interfere with the requirements of SIS'.[99] By the summer of 1941, Whitehall clearly still regarded the capabilities of SOE as secondary to the other services: the organisation had yet to demonstrate its strategic worth.

In order to support the activities of 138 and the newly formed 161 Squadrons, it was necessary to provide them with a dedicated airfield. The ideal solution, from the stance of the RAF, was to allocate them the 'condemned' airfield at Tempsford. Badly sited and prone to flooding, a number of runways could also not be used by fully laden bombers. By assigning this airfield to 138 and 161 Squadrons, the RAF pacified Whitehall whilst not impacting their strategic bombing campaign. Following 138 Squadrons move to RAF Tempsford in March 1942, Air Chief Marshall Sir Wilfred Freeman KCB DSO MC, Vice Chief of the Air Staff, berated Harris that his 'command still does not seem to realise …[the] great importance [of subversive warfare]'.[100]

On 16 April 1942, Freeman reiterated to Harris that 'H.M. Government attach the greatest importance to political and *subversive warfare,* for the successful conduct of which the co-operation of your Command is essential. The importance both of propaganda and subversive activities has recently been re-emphasised by the Defence Committee and the Chiefs of Staff Committee'.[101] Between August 1941 and March 1942 there occurred a sea-change within the British political landscape: no longer was SOE to be merely 'encouraged', but actively supported. This change in emphasis from SIS to SOE was reflected in the number of sorties undertaken by the RAF for both organisations. By 15 July 1943, only 10% of the operations flown by 138 and 161 Squadrons were on behalf of SIS.[102]

Within a changing political environment, the number of sorties flown by 138 and 161 Squadrons on behalf of SIS were declining from early 1942 (*Figure 94*). As their agents were not being transported by air, and few missions were undertaken by sea (*Figure 83*), presumably SIS relied on local amateur sources for their intelligence. These 'agents' might have conflicting loyalties, in the pay of the Germans or unknowingly compromise the security of their handlers. By not relying

[99] TNA CAB 79/13 287th Meeting War Cabinet 14/08/41. Author's emphasis.
[100] TNA AIR 20/2901 Letter from Freeman to Harris 23/03/1942. Author's emphasis.
[101] TNA AIR 20/2901 S.46368/III/VCAS 16/04/1942. Author's emphasis.
[102] TNA AIR 20/8242 Employment of 22 IE Halifax Aircraft now in Nos. 138 and 161 Squadrons at Tempsford p. 1

on ‘professionals’, SIS’s intelligence gathering from mainland Europe was potentially questionable.

Coinciding with a reluctant RAF’s increasing support for SOE was an altercation over operational control of the Helford Flotilla. In January 1942, the disagreement between SOE and SIS was settled by an Admiralty directive which transferred the base over to the NID. Although met with displeasure from the crews, this decision was to have little impact on SOE’s operational capabilities. The nature of maritime transportation meant that it would never have been feasible to handle the sheer volume of traffic required to supply the resistance. It was, therefore, inevitable that SOE never tried to re-establish this link. Plans to upgrade the function of the facility at Leigh-on-Sea into a maritime hub were shelved shortly thereafter. Internal discussions were also initiated with regard to the continuation of para-naval training. The year 1942 marked a change in SOE’s attitudes towards certain aspects of their maritime activities.

The sea-change in Whitehall’s attitude in early 1942 towards clandestine warfare had a remarkable effect on SOE’s transportation infrastructure. Through political ‘bullying’, the RAF increased the material support available to the organisation. Without these resources, the activities of SOE would have been severely curtailed. In order to successfully transport agents and supplies to where they were needed, it was essential that the organisation had reliable communications to the field. SOE’s wireless facilities are, therefore, the focus of the next chapter.

CHAPTER VII
Communications

To arrange for the necessary supplies to be transported to the field, it was essential that there existed a reliable and efficient communication system back to headquarters in London. Without this link, SOE's agents and the wider resistance would have been isolated in hostile territory. Communications were also vital for reporting enemy activities, arranging for the extraction of personnel, coordinating operations and organising missions.[1] Without direct contact with the resistance, SOE would have been unable to 'set Europe ablaze'. This two-way traffic was highly valued amongst the resistance in Europe.[2] Wireless communications were so important to the organisation that they invested heavily in providing state-of-the-art infrastructure.

Despite the value placed on wireless communications by SOE, their networks were not always under the direct control of the organisation. In an agreement made in September 1940, all traffic originating within SOE was handled by SIS. Under this arrangement, the head of SIS, C, maintained the right to reject any message deemed compromising to his organisation's security.[3] This situation was far from ideal for SOE. SIS could also not claim to be experts in the field of clandestine communications. At the time this agreement was signed, the organisation had only limited experience with wireless technology.

Although the Royal Navy had first installed wireless sets on HMS *Juro* and HMS *Europa* in 1899,[4] it was not until the spring of 1912 that Commander Mansfield Cummings, the first C, began contemplating using the technology.[5] By utilising radios, he saw the potential to obtain intelligence during periods of political

[1] Roderick Bailey, *Forgotten Voices of the Secret War: An inside history of Special Operations during the Second World War* (London, 2008) p. 186, Jorgen Haestrup, *Secret Alliance: A Study of the Danish Resistance movement 1940-45* Vol. 1 (Odense, 1976) p. 189, Roderick Bailey, *The Wildest Province: SOE in the land of the Eagle* (London, 2008) p. 57, Harry Kedwood, *In Search of the Maquis: Rural Resistance in Southern France 1942-1944* (Oxford, 1994) p. 182
[2] Pierre Lorain, *Secret Warfare: The Arms and Techniques of the Resistance* (London, 1983) p. 34
[3] David Stafford, *Britain and European Resistance 1940-1945: A Survey of the Special Operations Executive with Documents* (London, 1980) p. 38
[4] Wayne Cocroft, 'The Archaeology of Military Communications', *Industrial Archaeology Review*, 35.1 (2013) p. 66
[5] Keith Jeffrey, *MI6: The History of the Secret Intelligence Service 1909-1949* (London, 2010) p.30

tension which might signal a threat to British interests. It took another 26 years, however, until SIS finally established a communications group, Section VIII, under Captain Richard Gambier-Parry. As commercial technology had proved unsuitable for his requirements, one of Gambier-Parry's most difficult and urgent challenges was providing SIS's agents with wireless sets.[6] By the time the agreement between SOE and SIS was reached in September 1940, this unit had only two years experience.

By March 1942, SOE were noticing that their messages were not being handled in the appropriate manner, despite being marked of the highest priority. Internal investigations determined that it took SIS four days to deliver a telegram from SOE's Balkans or Middle East missions back to the UK. Of greater concern, however, was the ability of C to impose a form of 'inquisitive censorship over the whole of our [SOE's] activities'.[7]

SIS's control over SOE's wireless traffic also had the potential to impact the organisation's capacity to send agents abroad. It was SIS's opinion that they had the authority to limit the number of agents SOE handled to 'the capacity of the receiving scheme … [and] by the fact that to increase the number to any extent will constitute a menace to security'.[8] By April 1941, SOE was in the process of training between 300 and 400 students. This, however, was too great for the 'necessary arrangements made by S.I.S. for the reception of their messages as and when they arrive in the countries where it is proposed that they should operate'.[9]

Reluctantly, SIS finally conceded in February 1942 and transferred operational control of SOE's wireless traffic to the organisation. There remained, however, the caveat that SOE had to ensure that all necessary 'security requirements were met'.[10] C also retained the right to reduce the number of channels operated by SOE if it was 'found that interference or embarrassment to S.I.S. communications resulted … One more condition … is that it must be clearly understood that S.O.E. will not, under any circumstances, undertake any communications for the representatives of any Allied Power without reference to me'.[11] SOE agreed to these

[6] Keith Jeffrey, *MI6* pp. 10, 262, 318
[7] TNA HS 8/358 SO2 Communications through C 09/03/1941 p. 2
[8] TNA HS 8/358 To CD from E 16/03/1941 p. 1
[9] TNA HS 8/358 S.O.2 Communications 05/04/1941 p. 1
[10] TNA HS 8/321 C/8686 05/02/1942
[11] TNA HS 8/321 Communications 26/03/1942

conditions on 27 March.[12] By 1 June 1942, the organisation's officially separated from SIS.[13] Following this transfer, SOE developed a highly professional, state-of-the-art system of wireless communications with their agents operating within enemy occupied Europe.

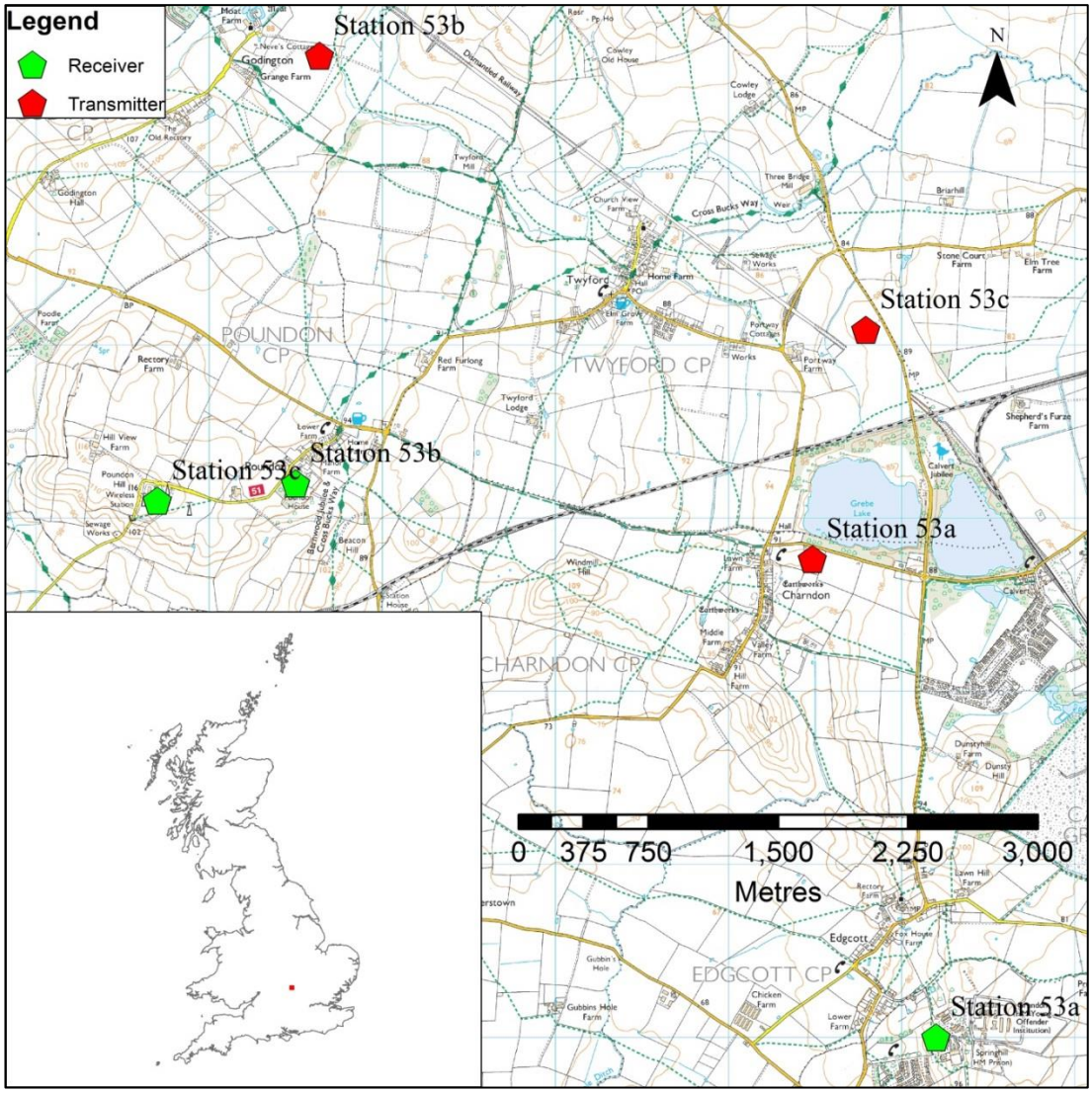

Figure 97: SOE controlled their wireless networks from three Home Stations established in Buckinghamshire. Contemporary wireless technology required transmitters and receivers to be located in separate locations to enable them to operate efficiently. If they were badly positioned, the two facilities could interfere causing unnecessary noise within the signal.

[12] TNA HS 8/360 Communications 27/03/1942
[13] Michael Foot, *SOE: The Special Operations Executive 1940-46* (London, 1993) p. 157

SOE's Network of Home Stations

Following C reluctantly agreeing to transfer wireless control to SOE, the organisation set about establishing independent facilities. Eventually, these three 'Home Stations', which comprised a separate transmitting and receiving site, were established between Bicester and Bletchley Park (*Figure 97*).

Within four months of the agreement between SOE and SIS being reached, the former were already operating a single Home Station. The receiver for this station was located at Grendon Underwood, Buckinghamshire, and named Station 53a,[14] whilst the transmitter was at Charndon, Buckinghamshire.[15] The establishment of SOE's first receiver at Grendon Underwood did not, however, occur without incident. Despite protracted discussions which identified this site as the organisation's preferred choice, Gambier-Parry began protesting in April 1942 that he had only just been informed of this decision.[16] He was concerned that as Grendon was only 10 miles from one of his most important receiving stations, there was a strong possibility that interference will result as both organisations worked within the same frequency band.[17] Gambier-Parry, therefore, hoped that SOE had not involved themselves 'in a lot of constructional work until the possibilities of interference have been thoroughly explored'.[18] It had, however, been Gambier-Parry who had suggested that SOE establish their new receiving station at Grendon Underwood.[19] By 13 April 1942, he was of the opinion that:

> 'it would be much better if we went into the matter now between our two selves and settled any possible causes of future disagreement before they arise, rather than wait until we have to take them formally to the W/T Board, should your detailed proposals be of a nature likely to cause embarrassment to existing services. As you will remember, there is a clause in "C"s letter to C.D. covering this particular point, and reserving to him the right to

[14] Grendon Underwood had previously been STS 53 and a school for training agents in the use of wireless communications.
[15] TNA HS 7/34 Station Construction Section p. 1
[16] TNA HS 8/321 CD/OR/1565 17/04/1942 p. 1
[17] TNA HS 8/321 Gambier-Parry to Ozanne 13/04/1942 p. 1
[18] Ibid p. 1. The site had been vetted for interference by the General Post Office (GPO) (TNA HS 8/321 CD/OR/1565 17/04/1942 pp. 1-2).
[19] TNA HS 8/321 CD/OR/1565 17/04/1942 p. 1

> ask you to curtail your activities should they result in interference with existing services. It therefore makes it obviously desirable that we should start right and not get into a position where friction might result.
>
> I imagine that with the establishments your organisation possesses up and down the country, there should be no difficulty in finding a place for your W/T centre which could not possible involve "C" in having to fall back on his rights in the matter'.[20]

At a Communications Committee Meeting held on 19 August 1942, the possibility of establishing an additional Home Station was raised. This new facility would lighten the increasing demands being placed on Grendon Underwood.[21] Although the date of the decision is unknown, Colonel William 'Wild Bill' Donovan, CDs opposite number in the OSS, was informed on 14 December 1942 that the second station had been constructed. He was also advised that plans for a third Home Station were being discussed.[22] When all three were completed, Station 53a, Grendon Underwood and Charndon, would only communicate with South Western Europe, Station 53b, Poundon and Godington, would handle all traffic to Central Europe, whilst Station 53c would deal with Scandinavia.[23]

In January 1943, SOE proposed that the third Home Station should be built, equipped, staffed and operated by the OSS. Remaining under the control of the Officer Commanding Station 53, a British Chief Signal Master would also be permanently based there to ensure the facility cooperated with Stations 53a and 53b. It was estimated that once operational, it would take at least six months before it could be fully staffed by Americans. In the meantime, SOE would supply the necessary personnel. Once the Home Station had been transferred to the OSS, SOE planned on retaining control of all enciphering and deciphering of messages.[24] The transmitter for Station 53c was located at Twyford, Buckinghamshire, whilst the receiver was at Poundon.

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[20] TNA HS 8/321 Gambier-Parry to Ozanne 13/04/1942 pp. 1-2
[21] TNA HS 8/357 Minutes of Ad Hoc Communications Committee Meeting in MS' Office on Wednesday, 19th August, 1942 p. 3
[22] The second Home Station had its transmitter at Godington and its receiver at Poundon. This facility was to be known as Station 53b (TNA HS 7/34 Station Construction Section p. 9).
[23] TNA HS 8/37 Confidential Memorandum for Colonel Donovan 14/12/1942 p. 1
[24] TNA HS 7/283 OSS/SOE p. 61

The Nature of SOE's Communication Facilities

The facilities associated with SOE's first foray into wireless communications were of a primitive nature. At Grendon Underwood, the first Signal Office was established in a downstairs room of the main house. This was rapidly proved of insufficient capacity to handle SOE's increasing traffic volume (*Figure 98*). The station's transmitters were located nearby at Charndon in a building measuring 20ft (6.1m) by 12ft (3.66m). Connected to the receiver by a 20-pair cable, the 18 250w transmitters could be operated by remote control (*Figure 99*). This facility also became rapidly overcrowded as SOE's needs grew. Inevitably, this resulted in considerable loss of efficiency and flexibility.[25]

Figure 98: Grendon Underwood, home to SOE's first receiver. This was initially located in a downstairs room, but relocated to a hut in the grounds after this proved to be insufficient. After the Second World War, this site was converted into a prison. The structures erected by SOE have, inevitably, been destroyed.

[25] TNA HS 7/34 Station Construction Section p. 1

Figure 99: SOE's first transmitter at Charndon. The structure to the left was the first transmitter building; the extension to the right was a later addition. Structural analysis indicates that there was at least three phases of construction.[26]

In October 1942, to alleviate the overcrowding at Grendon Underwood, SOE began constructing a new Signal Office within the estate (*Figure 100*). This structure was to prove a considerable improvement over *ad hoc* facilities in the main house. Within the new Signal Office, 18 operating positions were installed, four of which were equipped for automatic sending. The new superintendent's desk had the capabilities of connecting any position to any transmitter and also monitoring all receivers. In parallel to this building programme, the transmitter complex at Charndon also underwent an expansion. The new extension measured 35ft (10.67m) by 18ft (5.49m) into which SOE installed six 250w transmitters.[27]

[26] Author 2013
[27] TNA HS 7/34 Station Construction Section p. 1

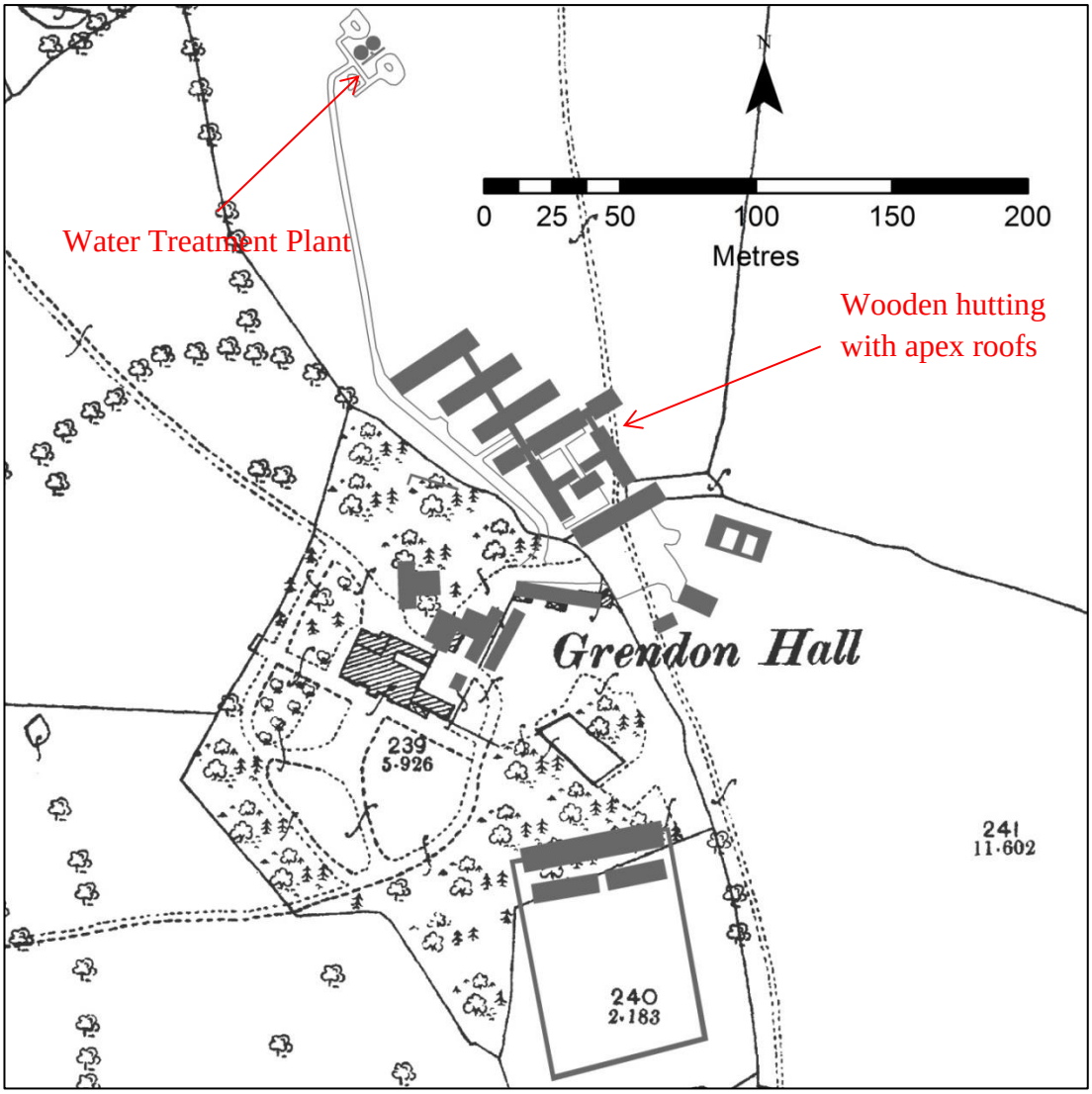

Figure 100: SOE's facilities at Grendon Underwood. Prior to it becoming a wireless facility, it taught agents the skills necessary to be radio operators. The location of the aerial farm could not be determined from aerial photographs.[28]

These building programmes, however, only provided SOE with a temporary respite. Gradually, demand once more outstripped capacity. It was eventually decided that the solution was a new purpose built facility instead of *ad hoc* additions to existing sites. On 14 December 1942, six months after gaining operational control of their wireless networks, SOE began constructing a purpose built Home Station.[29] The receiver for this new complex was located at Poundon, Oxfordshire (*Figure 101*) and the transmitter at Godington, Oxfordshire.[30]

[28] NMR RAF CPE/UK/2159/4138
[29] TNA HS 7/34 Station Construction Section p. 9
[30] TNA HS 8/37 Confidential Memorandum for Colonel Donovan 14/12/1942 p. 1

Figure 101: (centre) The receiver of SOE's first purpose built Home Station, Station 53b. Originally, the structure was square which indicates that an expansion of this facility occurred sometime after construction. This probably coincided with the two phases of construction at Godington.[31]

The new receiving station constructed by SOE at Poundon was substantially larger than the organisation's first attempt at Grendon Underwood. Measuring 40ft (12.19m) by 40ft (12.19m) by 12ft (3.66m), the building contained 40 operating positions of which over half were adapted for automatic sending. In order to economise on antennae, SOE installed new Wide Band Receiving Amplifiers at this facility. This technique allowed the organisation to operate as many as 50 receivers simultaneously from each amplifier (*Figure 102*).[32]

[31] English Heritage RAF/CPE/UK 2159 3075
[32] TNA HS 7/34 Station Construction Section p. 10

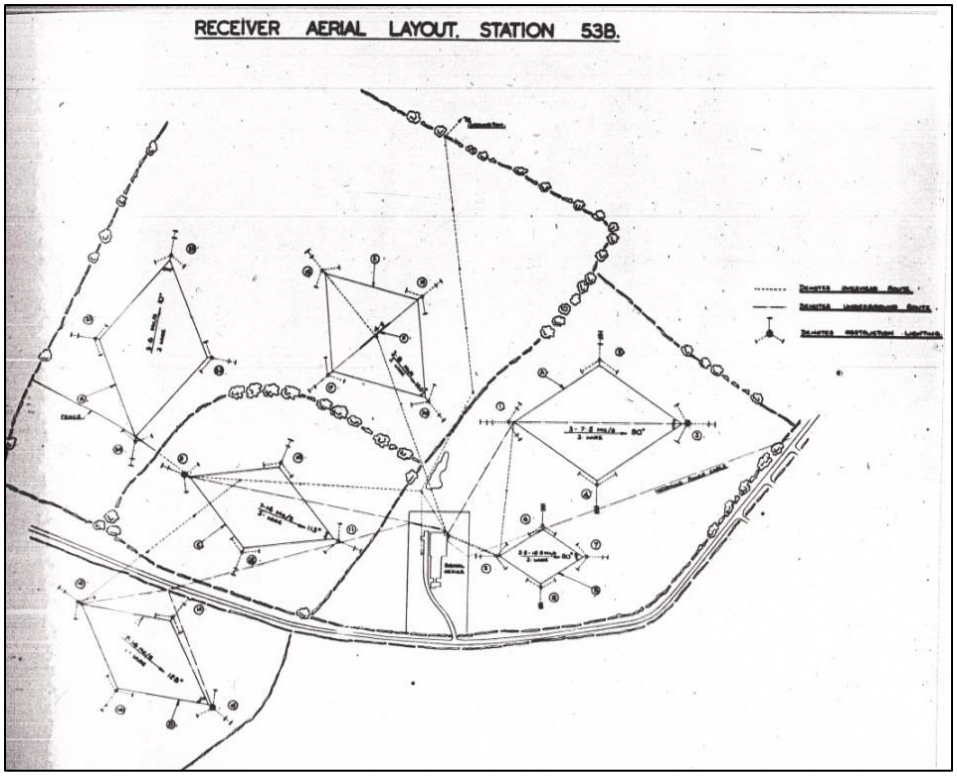

Figure 102: The aerial farm at SOE's Station 53b.[33]

Figure 103: The transmitter building of SOE's Station 53b at Godington. Structural evidence indicates that the complex was constructed in two phases.[34]

[33] IWM HU47920
[34] Author 2013

The transmitter for Station 53b was located nearby at Godington (*Figure 103* and *Figure 104*).[35] It was here that SOE constructed a building 100ft (30.48m) by 24ft (7.32m) which incorporated features allowing open wire feeder routes. Into the structure, 34 250w transmitters, together with their remote control apparatus were installed. To connect up these sets, over 6,000ft (1,828.8m) of lead covered wire was required. In order to replace malfunctioning equipment quickly, all the transmitters were mounted on platforms (*Figure 105*). The messages sent from Godington would be transmitter from one of the 32 di-poles or two rhombic antennae erected nearby (*Figure 106*).[36] These required over 10,000ft (3,048m) of wire and 3,000 spreaders in the down leads.[37]

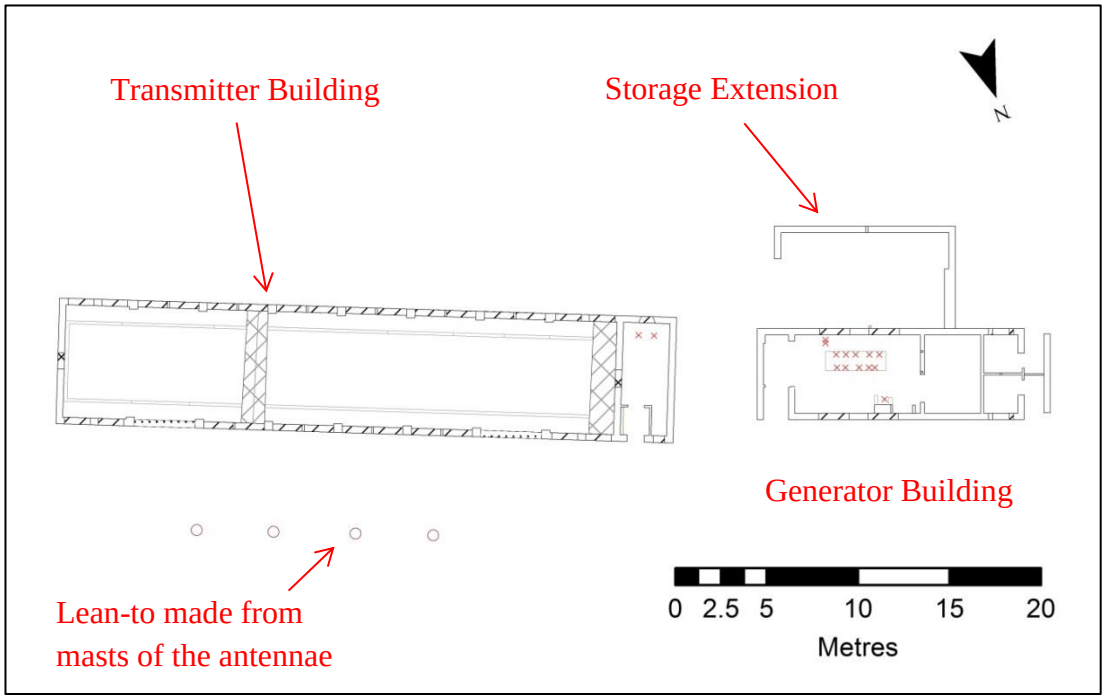

Figure 104: Architectural survey of Station 53b transmitter, Godington. Architectural evidence indicates the generator building came first. The transmitter building was constructed at the same time as the storage extension.[38]

Owing to the clandestine nature of SOE's wireless traffic, it was highly desirable that an operator could change frequency on any transmitter with great speed. This restricted the German interceptors' ability to transcribe messages in their

[35] See Volume II Appendix B: Godington Building Survey.
[36] These were made from six 20ft (6.1m), one 80ft (24.38m) and 15 100ft (30.48m) masts.
[37] TNA HS 7/34 Station Construction Section pp. 10, 11
[38] Author's diagram.

entirety. Contemporary 250w transmitters required an average of four to five minutes to accomplish this accurately. SOE, therefore, began researching a solution to this problem. The result was the development of a Wide Band Transmitting Amplifier working with a three wire rhombic antennae. This provided a good signal over a wide area combined with the ability to transmit on 12 channels simultaneously.[39] More importantly, it enabled an average operator to change frequency in as little as 30 seconds.[40]

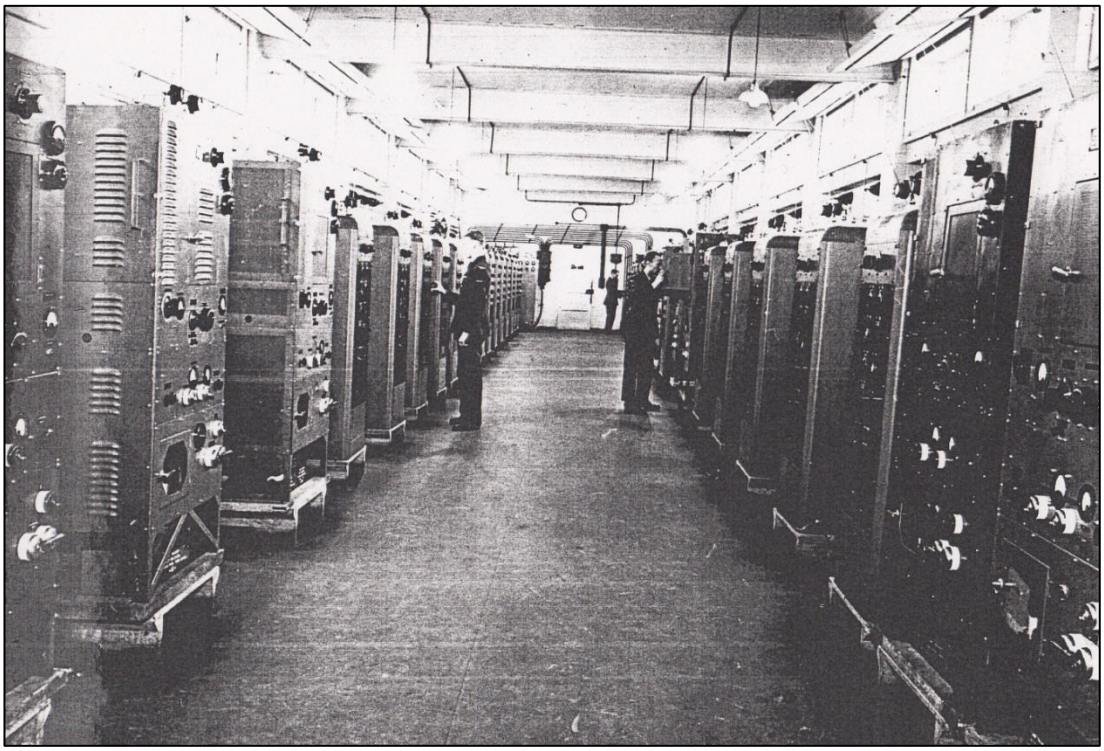

Figure 105: The interior of Station 53b transmitter at Godington. To ensure that equipment could be replaced quickly, the transmitters were mounted on platforms.[41]

On completion of Station 53b's transmitter at Godington, SOE's wireless demands still outstripped capacity. It was, therefore, decided to incorporate Wide Band Receiving Amplifiers at Stations 53a's transmitter at Charndon.[42] Instead of installing these in the pre-existing structure, a new building was constructed based

[39] Each channel gave a field strength equal to that from a 250w transmitter connected to a resonant half-wave dipole.
[40] TNA HS 7/34 Station Construction Section pp. 10, 11
[41] IWM HU47925
[42] TNA HS 7/34 Station Construction Section p. 11

on the design of Godington (*Figure 107*).[43] This allowed for the centralisation of all equipment into a single building whilst also providing sufficient space for the number of transmitters to be increased. Within this structure, SOE also installed a new 'trouble-free' remote control system which required over 3,000m of twin lead covered wire to operate. Transmission occurred over 35 dipoles and two rhombic antennae formed from 16,000ft (4,876.8m) of wire and five 120ft (36.58m), 12 100ft (30.48m), four 80ft (24.38m) and two 60ft (18.29m) masts. The feeder route also required 100,000ft (30,480m) of copper wiring.[44]

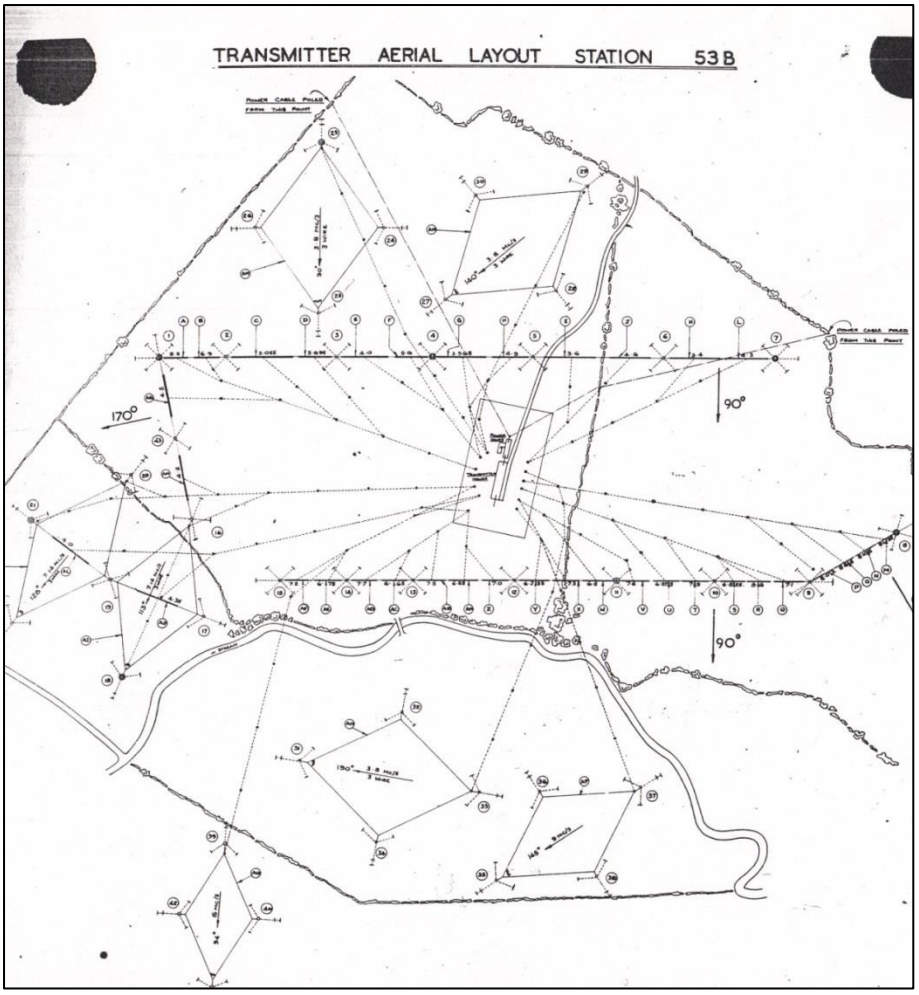

Figure 106: The aerial farm at Godington. This comprised of 32 di-poles and two rhombic antennae. The remains of some of these antennae were later used to create a lean-to against the transmitter building.[45]

[43] Structural evidence indicates that the complex was erected in two distinct phases. It is the second phase of construction which the new complex at Charndon was based upon.
[44] TNA HS 7/34 Station Construction Section pp. 11, 12
[45] IWM HU47922

The nature of SOE's wireless facilities demonstrates an organisational appreciation of the value of reliable and efficient communications to clandestine warfare. Although initially, SOE's wireless traffic was handled at *ad hoc* facilities, it only took six months before the organisation decided to construct a state-of-the-art Home Station. SOE continued to expand their network by both upgrading existing facilities and constructing new Home Stations.

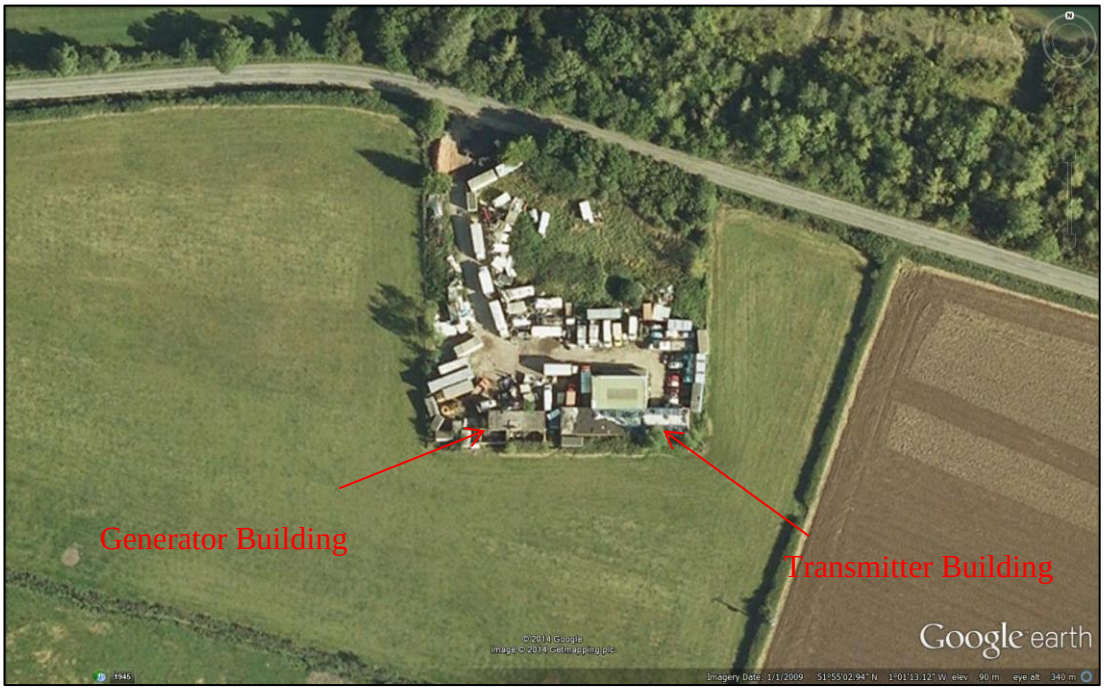

Figure 107: Station 53a's new transmitter at Charndon. Based on the design of Godington, this facility was constructed to enable SOE to keep up with increasing operational demands for wireless communications.[46]

SOE's Home Stations Compared against Contemporary Wireless Facilities

In order to comprehensively assess the nature of SOE's Home Stations, it is essential that a comparison is made with contemporary facilities. By evaluating these sites against the organisation's peers, SOE's appreciation of the value of wireless communications can be demonstrated. Although the organisation internalised the

[46] Permission to enter this facility was not granted for this thesis.

construction process in 1942, the architectural and technological nature of their Home Stations were in keeping with contemporary facilities.

Within the UK, the greatest expertise in wireless broadcasting at the time lay with the British Broadcasting Corporation (BBC). Twenty years before the outbreak of the Second World War, the corporation had determined that the majority of broadcasting 'shut downs' had been caused by failings in the National Grid. To overcome this when they were establishing a regional scheme of twin wireless transmitting stations, each facility was provided with a self-contained generating plant. These provided the BBC with a more reliable service and the ability to fluctuate voltage.[47]

Once the decision was taken to provide independent power to broadcasting facilities, the impact generators might have on service became an important issue. If the engineers did not carefully consider the positioning of this equipment, the noise and vibrations from these machines could affect the delicate wireless sets. It was essential that silence prevailed in the transmitter room for the comfort of the technicians operating the equipment. This also made it easier to locate faults caused by arcing and sparking.[48] At the General Post Office (GPO) short-wave receiving station they on the Hoo Peninsular, Kent, the generator room was completely isolated from the rest of the site.[49]

In certain facilities it was not possible to physically segregate the generating machinery. It was, therefore, essential that it was isolated to negate its negative impact. At the WRC broadcasting station located in an office building on 14th Street and Park Road, Washington, engineers mounted the generator on a steel bed atop a 0.08m cork mat.[50]

During the construction of SOE's transmitter at Godington, the organisation adhered to contemporary design standards for wireless facilities (*Figure 108*).[51] In order to limit the impact the generator might have on the delicate wireless

[47] Peter Eckersley and Noel Ashbridge, 'A Wireless Broadcasting Transmitting Station for Dual Programme Service', *Journal of Institute of Electrical Engineers*, 68.405 (1930) p. 195
[48] Ibid p. 195
[49] Derwin Gregory and Sarah Newsome, *Cooling Radio Station: An Archaeological Investigation of a Short-Wave Receiving Station* (Swindon, 2010) RDRS 110/2010 p. 18
[50] Julius Weinberger, 'Broadcast Transmitting Stations of the Radio Corporation of America', *Proceedings of the Institute of Radio Engineers*, 12.6 (1924) p. 798
[51] This design standard was also observed in the construction of the new transmitter facility at Charndon. As this new station was based on the design of Godington, the generator was again installed in a separate building.

equipment, SOE installed the machinery in a separate building. For practical reasons it also had to be bolted to a concrete bed inset into the floor of the structure. This further shielded the transmitting equipment from vibrations.

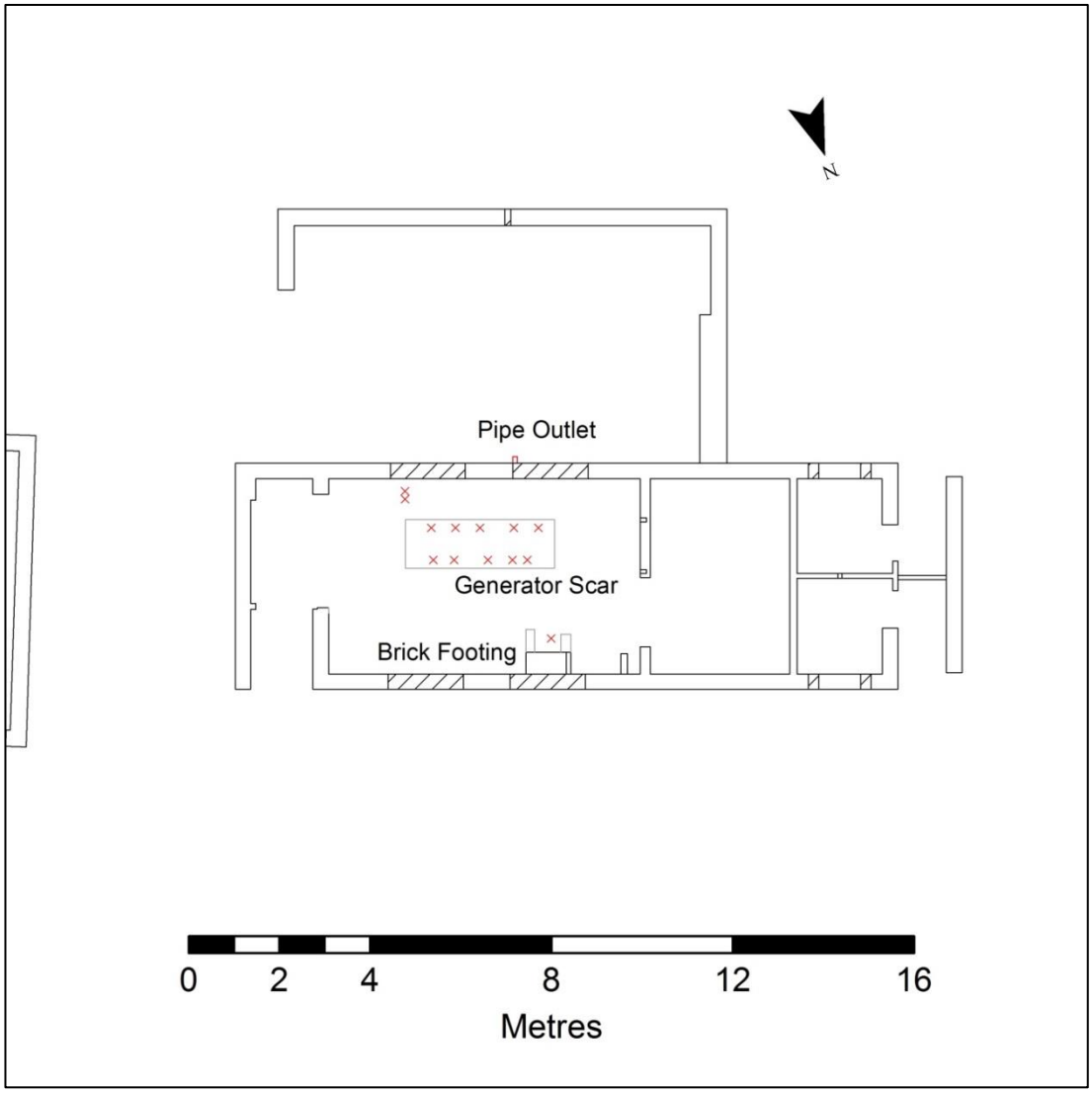

Figure 108: Station 53b's generator building at Godington. To limit the negative impact on the delicate equipment, the building was isolated from the transmitter building.[52]

Other contemporary design standards were also adhered to by SOE during the designing of the new transmitter building at Godington. At the 50kw frequency-modulation transmitter in the Helderberg Mountains, New York, the facility was arranged to allow for the maximum accessibility to components for inspection and

[52] Author's diagram.

maintenance.[53] In stations operated by the BBC, this was achieved by arranging transmitters either side of the room whilst keeping the rest of the structure free from clutter.[54] At Godington, the same principle was applied by SOE when they constructed a large airy room with equipment arranged along both walls. Despite the internalisation of the construction process from the end of 1942,[55] SOE demonstrated a high level of professionalism, knowledge and competence relating to contemporary design standards.

The quality of SOE's wireless facilities can be further demonstrated by comparing them with the equivalent sites operated by SIS. At the outbreak of the war, SIS's Section VIII was responsible for communicating with their agents abroad.[56] Initially, this was conducted from rooms within the main house at Bletchley Park. As this was to rapidly prove insufficient for their requirements, Section VIII had begun the process of relocating to Whaddon Hall, Buckinghamshire, prior to the close of 1939 (*Figure 109*).[57]

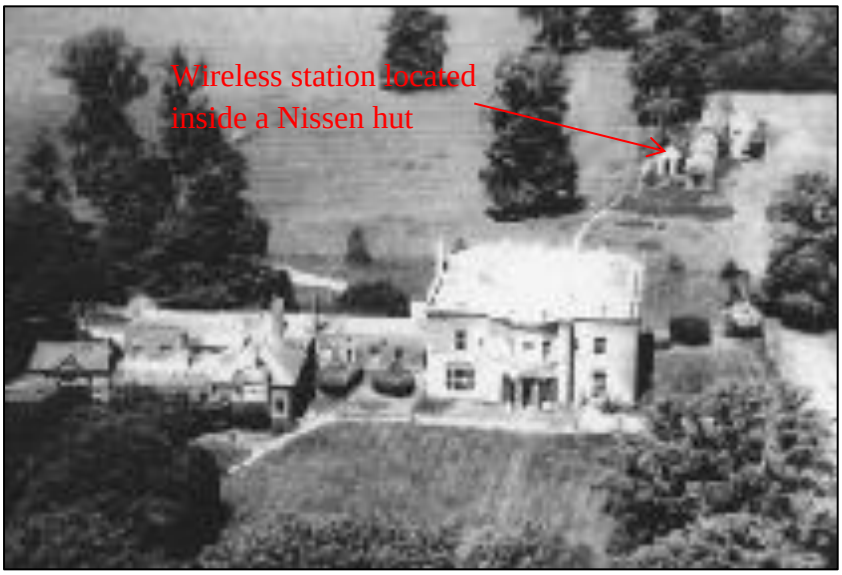

Figure 109: Whaddon Hall home to SIS's Main Line Station. The corrugated iron building in the background housed the wireless equipment.[58]

[53] H Thomas and R Williamson, 'A Commercial 50-Kilowatt Frequency-Modulation Broadcast Transmitting Station', *Proceedings of the Institute of Radio Engineers*, 29.10 (1941) p. 539
[54] Peter Eckersley and Noel Ashbridge, 'A Wireless …', p. 204
[55] TNA HS 7/15 Properties Section History p. 6
[56] Keith Jeffrey, *MI6* pp. 262, 318. Section VIII had only been established 17 months before war was declared. This section, therefore, had limited experience at the start of the conflict.
[57] Geoffrey Pidgeon, *The Secret Wireless War: The Story of MI6 Communications 1939-1945* (Richmond, 2008) p. 27
[58] Ibid p. 81

This property was to become SIS's new 'Main Line' station. It was this facilities responsibility for handling the organisation's traffic originating from embassies and overseas missions, covert stations on the continent and occasionally to communicate directly with agents. Over the course of the war, SIS was also to establish facilities at Dower House, Buckinghamshire, Windy Ridge, Buckinghamshire, Tattenhoe Barn, Buckinghamshire and Creslow Manor, Buckinghamshire.[59]

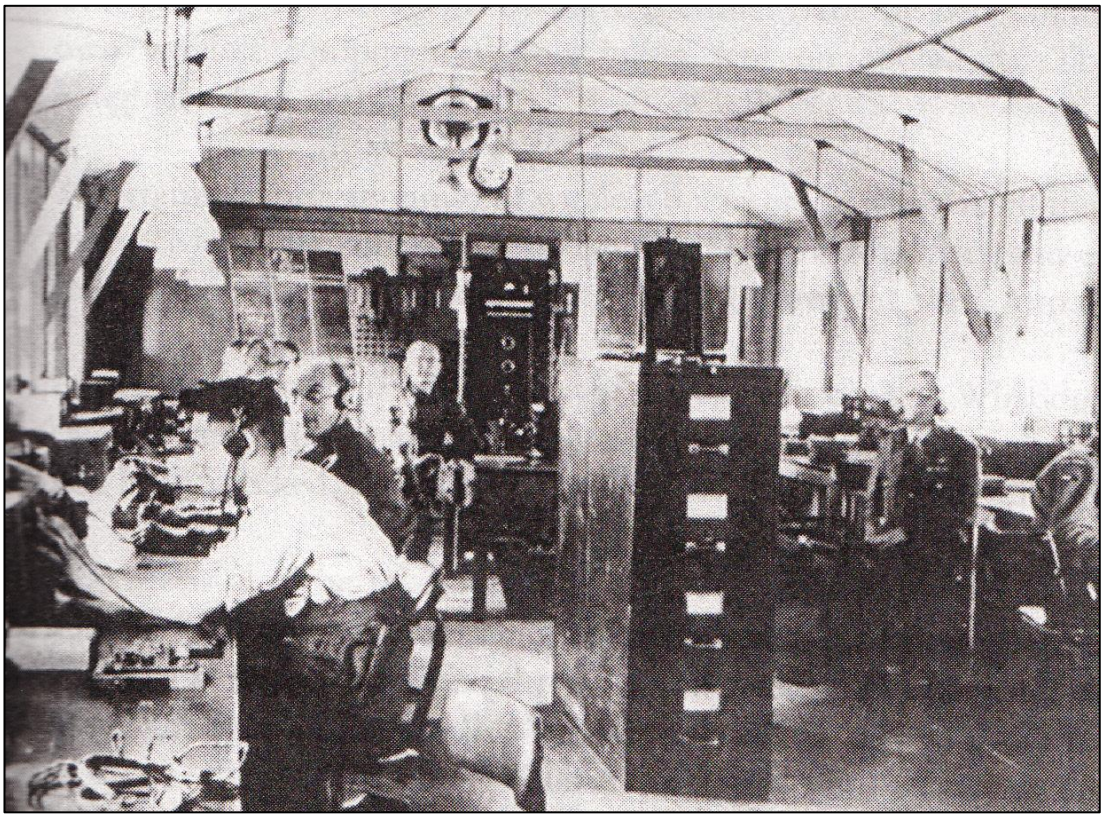

Figure 110: Inside of SIS's wireless facility at Upper Weald. This arrangement is relatively basic and cramped.[60] The basic wood construction of this station meant the conditions inside were not conducive to work.

It was not until May 1940, however, that SIS began constructing their first purposely designated wireless facility for handling just agents' traffic. By the autumn of that year, work constructing the new receiving station at Nash, Buckinghamshire, was completed. The corresponding transmitter was located at Manor Farm,

[59] Geoffrey Pidgeon, *The Secret Wireless War* pp. 80, 81, 82-3, 114, 262
[60] Ibid p. 83

Calverton, Buckinghamshire. At a later date, SIS opened a further receiving station at Upper Weald, Buckinghamshire, which also worked with Manor Farm.[61]

At Nash, SIS constructed a shed to accommodate their receiving equipment and a brick built generator building with an attached battery store. Its sister station at Upper Weald was slightly larger as two sheds were provided alongside the brick built generator and battery store (*Figure 110*).[62] Compared to the facilities operated by SOE (*Figure 111*), it is SIS that looks unprofessional.

Figure 111: The interior of one of SOE's receiving facilities.[63] *The automatic control of the transmitters meant that the radio operators were based at the receiver. Compared to SIS's facilities, this is light, airy, spacious and conducive to efficient and effective wireless communications.*

Throughout the war, SIS's facility at Nash had an establishment of nine men operating a three-watch system. One of these was Jack White who recalls that the station had access to eight receivers: seven HROs, manufactured by the National Radio Company, and his personal battery operated AR88.[64] At SIS's Manor Farm

[61] Geoffrey Pidgeon, *The Secret Wireless War* pp. 80, 81, 82-3, 114, 262
[62] Ibid pp. 82, 287
[63] IWM HU47909
[64] On average this station handled six contacts per hour.

facility, the transmitters comprised of various American 750w and British 100w and 30w sets.[65] To ensure the American equipment was maintained effectively, the organisation accommodated four engineers from the US Civilian Technical Corps at this facility.[66] To receive the messages, Upper Weald erected semi-vertical wires suspended from relatively low cantilever wires. It took SIS until 1944 to arrange for a crew of aerial erectors to improve this *ad hoc* receiving system.[67]

Throughout the war, a clear disparity existed between the wireless facilities operated by SOE and SIS. There was even a feeling amongst SIS's Section VIII's radio operators that the organisation viewed communicating with their agents as a lower priority than intercepting enemy transmissions.[68] In contrast, SOE recognised the importance of these networks and invested significant resources in providing state-of-the-art wireless facilities. The rapid development and expansion of their Home Stations quickly provided the organisation with a superior wireless network to SIS. This professionalism was recognised by the wider armed services and demonstrated by the number of frequencies allocated to the organisation for Operation OVELORD (*Figure 112*).

In preparation for Operation OVERLORD, SOE was allocated 200 frequencies for clandestine activities and a further 66 for joint military operations.[69] Combined, these were equivalent to 13% of all the total frequencies allotted for the invasion. This put the organisation's allocation behind the army and RAF, but ahead of the Royal Navy. By providing SOE such a large number of frequencies, the armed services were demonstrating a faith in the professionalism of the organisation. In addition, the War Office requested that SOE supply all Special Forces involved with the invasion with one time pads,[70] further demonstrating the faith placed in the organisation's wireless capabilities.

[65] In contrast, SOE operated a standard 250w transmitter which ensured a greater efficiency.
[66] Geoffrey Pidgeon, *The Secret Wireless War* pp. 114, 285-6, 295. The US Civilian Technical Corps was a quasi-military organisation established in 1941 to assist the UK in the war effort within the UK.
[67] Ibid p. 295
[68] Ibid p. 295
[69] Ibid p. 2
[70] Leo Marks, *Between Silk and Cyanide: The Story of SOE's Code War* (London, 1998) p. 459

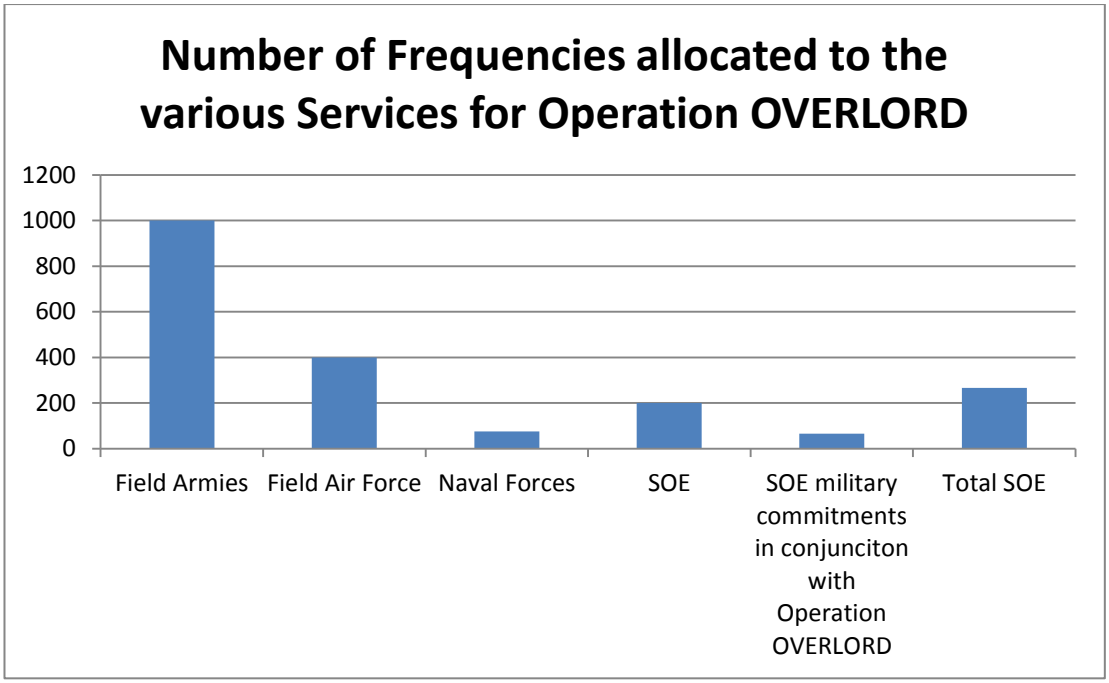

Figure 112: Number of frequencies allocated to the various services for Operation OVERLORD. Those allocated to SOE far exceed those of the Royal Navy. In total, SOE were allocated approximately 13% of all frequencies intended for the invasion of Europe.[71]

The Role of SOE's Wireless Facilities in Operation NORDPOL

At this point, it is worth discussing the episode that has been partly responsible for tarnishing SOE's reputation. The disaster which was to blemish the organisation's legacy befell the Dutch Section during the German run Operation NORDPOL.[72] This counterintelligence mission had its origins in the arrest of Huub Lauwers in The Hague on 6 March 1942.[73] Under intensive interrogation, Lauwers inevitably broke and agreed to turn double agent. On 12 March 1942, he began transmitting to London on behalf of his jailers. Despite identifying that he had been capture by omitting his security checks, Lauwers was shocked to be informed of the

[71] TNA HS 7/34 Signal Planning Section p. 2
[72] Operation NORDPOL was also known as the *Englandspiel.*
[73] He had only been on the air for a few weeks before his address was pinpointed by the efficient German direction finders.

imminent arrival of Lieutenant Arnold Baatsen.[74] On the night of 27 March, this agent parachuted into the Netherlands and was immediately arrested. The *Abwehr* now had a solid foundation on which an elaborate deception could be built. This saw them capture over 50 wireless operators of the Dutch resistance and persuade them to communicate with London on their behalf.[75]

In post-war assessments, the centrality of SOE to the disaster of Operation NORDPOL has rarely been challenged. It was not until 2006 that the fact SOE did not gain operational control of their wireless networks until June 1942 was first raised in academia:[76] this was three months *after* the first radio play-back from the Netherlands.[77] It will be argued here, however, that complete transfer of operational control of SOE's wireless networks did not occur until much later in 1942.

Whilst SIS and SOE were discussing this transfer, SOE's Captain Chalk recorded on 17 December 1941 that with the 'present section [of personal at Grendon Underwood] and the possible opening of the [wireless] station in March, I feel that I shall almost be forced to attempt to operate almost every channel myself during the first month or two'.[78] In Chalk's opinion, the operators' work was 'bad even for army standards. It will be quite impossible for any of them to be good enough for their proposed job for some months after their arrival at the station'.[79] By 10 June 1942, SOE were only just 'now *starting* to run our own wireless communications'.[80] This is indicative of a slow transfer of operational control of networks from SIS to SOE, instead of an instantaneous event.

Combined with these staffing issues, SOE was also initially beset by equipment shortages. On 28 June 1942, the organisation expressed concern that the 'manufacturers have not yet been able to supply the R.A.F., and in turn us, with the quantity [of receivers] that we require for working'.[81] By the time SOE was meant to have taken over the operation of their wireless networks, they still had yet been issued with a full complement of receivers and were understaffed. Things had hardly

[74] Security checks were identifying features which were incorporated into messages which were inform London that the operator was compromised.
[75] Nigel West, *Secret War: The Story of SOE Britain's Wartime Sabotage Organisation* (London, 1992) p. 93
[76] Jo Wolters, 'Remarks concerning a research note on The Dutch Affair', *Intelligence and National Security*, 21.3 (2006) p. 462
[77] Hermann Giskes, H, 193 *London Calling North Pole* (London, 1953) p. 74
[78] TNA HS 8/357 Personnel and Establishment of Military Station No. 8 17/12/1941 p. 3
[79] Ibid p. 1
[80] TNA HS 8/360 ARB/SGB/1306 10/06/1942. Author's emphasis.
[81] TNA HS 8/357 MS/G/720 28/06/1942

improved by the start of 1943 when their Home Station was still an 'administrative and technical mess… [whose staff were] ill trained and many were psychologically unsuited to the emotional stress imposed by clandestine Signals'.[82]

SOE's capacity to handle agents' traffic was severely hampered by these initial limitations on equipment and qualified staff. On the night of 22 August 1943, Yvonne Cormeau parachuted into France to work as Lieutenant Colonel George Starr's radio operator. Over the following 13 months she transmitted 400 messages back to London at an average of 30 per month. On 11 April 1944, Lieutenant Denis Parsons joined Starr's network as a second wireless operator. In a 72 day period, he transmitted 84 messages, the equivalent to 42 per month. It has been estimated that during July 1943, SOE was receiving 120 messages per day from representatives of the French Resistance.[83] Figures for Station 53, however, indicate that only a fraction of these were handled by SOE.

Between 17 July and 28 August 1942, it was recorded that a total of 423 messages were received at Station 53 from SOE's agents in the field.[84] Over this 43 day period, 149 messages arrived from the Fighting French, 128 from other French agents, 74 from Belgium, 38 from the Netherlands and 34 from other countries from which SOE operated.[85] These figures indicate that SOE received six messages per day from the resistance in France during August 1942, significantly less than the 120 messages per day they received during July 1943.[86]

On 28 August 1942, SOE placed an order for six 'A' wireless sets to provide their Dutch agents were spare equipment.[87] If these were SOE's sole representatives in the Netherlands, then they were transmitting, on average, four messages per month.[88] Major Hermann Giskes, the *Abwehre* officer in charge of Operation NORDPOL, recorded that following the arrival of agent 'RLS' into the field on 28 February 1942, the Germans increased the number of messages played back to the

[82] TNA HS 7/33 Progress at the Base Station p. 4
[83] Jean-Louis Perquin, 2011 *The Clandestine Radio Operators: SOE, BCRA, OSS* (Paris, 2011) pp. 8, 26, 28, 29
[84] Of these messages, 32 were badly mutilated and 134 slightly mutilated.
[85] TNA HS 8/363 Mutilated Messages 04/09/1942
[86] Between 17 July and 28 August 1942, SOE received 149 Fighting French messages and 128 messages from other French sources. This is a total of 277 over a period of 1.5 months. Over a two month period they would have received approximately 369 messages which equates to 185 messages per month. July has 31 days so average number of messages per day would be approximately 6.
[87] TNA HS 8/357 DCD0/162/MG.1 28/08/1942
[88] 43 days is approximately 1.5 months. Therefore, over two months the W/T operators would have transmitted 50 messages. Each month they would have transmitted 4 messages each.

UK to several per day.[89] This rate of transmission far exceeded the number of messages handled by Station 53 from the Netherlands between July and August 1942.

Based on the traffic generated by Cormeau and Parons, the reception of 423 messages over a 43 day period at Station 53 was uncharacteristically low. The disparity between these figures is suggestive of an organisation that lacked the capacity to operate their entire wireless network. Presumably, SIS continued communicating on behalf of SOE whilst the latter expanded their wireless facilities. It was not until March 1943, when Station 53b became operational,[90] that SOE gained the capacity to handle the majority of their own traffic. This was a full year after SIS supposedly stopped communicating on their behalf.

By the end of 1942, the possibility that the Dutch network had been compromised was known within SOE's upper echelons. To confirm his suspicions, Leo Marks, the organisation's code maker, requested the 'code groups which had been received and decoded by C's wireless station … so that I could establish the length of the keys the agents had chosen and see if there'd been any significant changes in their coding groups'.[91] Before transferring control of SOE's wireless networks to the organisation, it had been the responsibility of SIS to provide their agents with coding procedures.[92] As Marks had to request the code groups, this suggests SIS only provided SOE with deciphered, clear text. Without access to the raw, encrypted messages, SOE lacked the necessary information to determine whether their Dutch network had been compromised. This was compounded by the handicap of not controlling their entire communication network until late in 1943.

In post-war assessments of SOE, the organisation has regularly been accused of incompetence for failing to notice that their Dutch network was being run by the *Abwehre* over a 20 month period.[93] These criticisms, however, unquestionably accept the immediacy of the transfer of wireless control from SIS to SOE in June 1942. The development of SOE's wireless facilities indicates that the organisation

[89] Hermann Giskes, *London Calling North Pole* p. 62
[90] Leo Marks, *Between Silk and Cyanide* p. 142
[91] Ibid p. 134
[92] TNA HS 8/321 Draft of SIS Proposals for an Amended Annex II to be Attached to the Paper Entitled 'Subversion' p. 3. The coding system used by SIS, and imposed on SOE, was the 'Poem' code. This was an insecure system which could be easily broken. It required an agent to memorise a poem and then rearrange the words and then number the letters. The numbers were then used as a key to the cipher.
[93] Nigel West, *Secret War* p. 99

did not have the capacity to become fully independent until halfway through Operation NORDPOL. If blame is to be apportioned anywhere, it is arguable SIS that should shoulder some of the burden.

In January 1943, Marks finally managed to provide firm evidence that SOE's Dutch networks had been compromised.[94] Following this confirmation, the organisation continued to transport agents to the Netherlands for a further four months.[95] It was not until October 1943, however, that supply missions were finally cancelled.[96] The failure to act on Mark's intelligence was not an operational oversight, but a bureaucratic one. SOE's turbulent relations with rivals had created a situation whereby the organisation felt it necessary to outwardly maintain an image of professionalism.[97] Acknowledgement of a disaster of this magnitude would have had potentially catastrophic implications for SOE.

SOE's Wireless Facilities: A Lifeline to the UK

The advent of wireless technologies at the turn of the nineteenth century brought a new dimension to the battlefield: instantaneous, long distance communications. Radios enabled the military to relay real-time information and act immediately on their intelligence. Early experiences within SOE also proved that this technology was vital to clandestine operations. By having a direct link to the Allies, the resistance could organise supplies, coordinate operations and communicate intelligence. Radio operators were, therefore, highly prized on the continent.[98]

Despite the vital nature of communications to SOE's operational efficiency, SIS's Colonel Claude Dansey argued that his organisation should retain control of SOE's wireless networks on its formation.[99] The head of SIS, C, was also 'absolutely opposed to any other Secret W/T Service being set up in the U.K. I fought long enough to try and maintain one Secret Service, and this would be another step in the

[94] Hugh Van der Mandele, 'The Dutch Affair Revisited or the Destructive Power of Organizational Warfare', *Intelligence and National Security*, 28.6 (2012) p. 2
[95] Hugh Van der Mandele, 'The Dutch Affair …', p. 3
[96] Hermann Giskes, *London Calling North Pole* p. 122
[97] Hugh Van der Mandele, 'The Dutch Affair …', p. 3
[98] Pierre Lorain, *Secret Warfare* p. 34
[99] Anthony Read and David Fisher, *Colonel Z: The Secret Life of a Master of Spies* (London, 1984) p. 270

wrong direction, apart from the unlikelihood of S.O.2 being able to set up anything for many months which would give efficient results'.[100]

This situation, which was far from satisfactory for SOE, enabled SIS to read and censor all their 'rivals' wireless traffic. SOE were under no illusion that 'C. telegrams take complete preference over [ours]'.[101] There was, therefore, an inevitable delay in SOE's communications which was only to become exacerbated as the organisation grew.[102] Messages handled by SIS were also not secure as they insisted on using poem codes. It was only after wireless control was passed to SOE that they could change to one-time pads.

As the reliance on SIS to communicate with their agents was having a negative impact on the organisation, SOE began presenting their case for the transfer of wireless control. It was not until 27 March 1942, however, that an agreement was reached between the two organisations.[103] SOE were finally in a position to begin transmitting by 22 May 1942,[104] the partition did not occur until 1 June.[105] Complete separation did not occur until the following year.

Following this transfer of operational control, SOE were concerned that SIS were finding alternative ways to read their traffic. On 7 August 1942, they ordered an investigation into the possibility of SIS tapping the teleprinters between London and Station 53.[106] Although they determined that the 'line does not actually run through the Broadway Building, it is technically possible for "C" to tap our traffic at some point along the route without our being aware of the fact'.[107] This level of mistrust inevitably led to 'petty bickering' between the two organisations which was observed by contemporaries.

Despite their late arrival in the field of wireless communications, SOE quickly outstripped the capacity and capabilities of SIS. Operating from cramped, basic facilities with no standardisation of equipment, SIS placed little emphasis on efficient and reliable wireless communications. SOE were 'aware that the information which "C" gets from his own direct agents in foreign countries

[100] TNA HS 8/358 C/6050 21/03/1941 p. 2
[101] TNA HS 8/358 SO2 Communications through C 09/03/1941 p.1
[102] TNA HS 8/358 SO2 Communications 05/04/1941 p. 1
[103] TNA HS 8/321 Communications 27/03/1942
[104] TNA HS 8/360 ADP/TC/1195 22/05/1942
[105] Michael Foot, *SOE* p. 157
[106] TNA:PRO HS 8/357 DCDO/1173 07/08/1942
[107] TNA HS 8/357 MS/KV/804 09/08/1942

represents what I would call an almost negligible proportion of the total information which he receives from wireless intercepts (Order of Battle) from the G.C-in-C.S., from Missions abroad'.[108]

SOE's success in the field of wireless communications proved that the organisation was 'on the whole more hardworking and enthusiastic [than SIS], and that we are not afraid of challenging them when they try to double-cross us'.[109] This contributed to SIS viewing SOE as a 'very dangerous rivals'.[110] Of all the facilities operated by SOE in the UK during the Second World War, their Home Stations have left the greatest physical legacy. In order to coordinate communications with the European Resistance, it was essential that SOE had an effective Command and Control network. The nature of this system will be discussed in the following chapter.

[108] TNA HS 8/321 M/OR/170 19/01/1942
[109] Ibid
[110] Ibid

CHAPTER VIII
Command and Control

For an organisation to operate effectively, it must have an efficient and professional Command and Control infrastructure.[1] Without this in place, management lacks the necessary administration to coordinate internal activities and collaborate externally.[2] Activities associated with the running of an organisation require no unique infrastructure: provided headquarters have access to sufficient office accommodation and stationary, management could function.

Throughout the Second World War, SOE concentrated their Command and Control infrastructure within London. This chapter will demonstrate that as a security precaution, the organisation compartmentalised their activities within the capital. The nature of SOE's relationship with Whitehall can also be informed by this distribution. Within this chapter an in-depth analysis of the organisation's facility to provide 'food for thought' is also presented.

[1] The United States of America's Department of Defence defines Command and Control as: 'The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission' (Department of Defence, *Dictionary of Military and Associated Terms* Joint Publication 1-02 (Washington, 2010) p. 74).
[2] See David Alberts and Richard Hayes, *Understanding Command and Control* (Washington, 2006), Thomas Coakley, *Command and Control for War and Peace* (Collingdale, 1992), Carl Builder, Steven Bankes and Richard Nordin, *Command Concepts: A Theory Derived from the Practice of Command and Control* (Santa Monica, 1999).

SOE's Command and Control Distribution

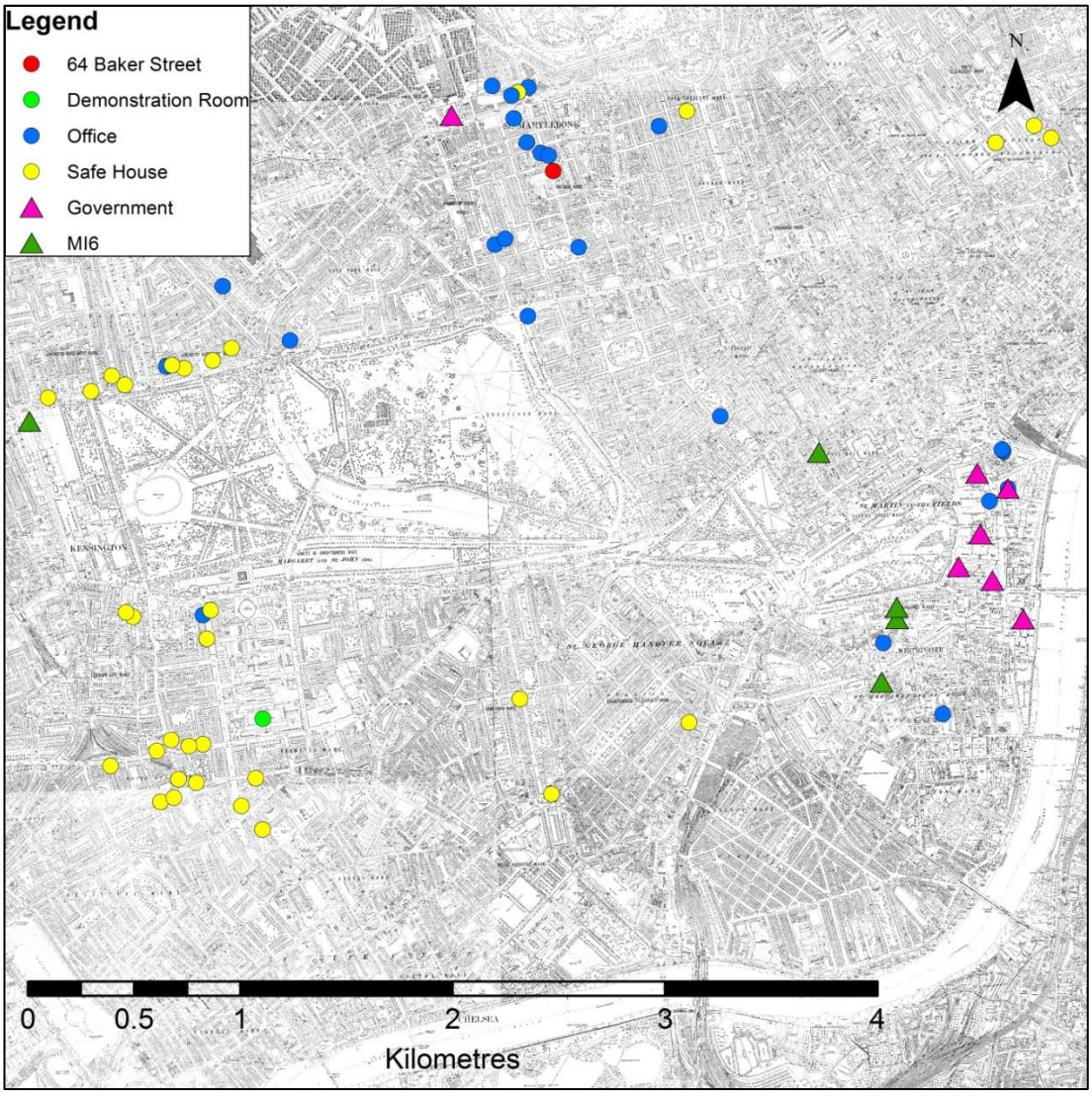

Figure 113: SOE's Command and Control infrastructure within London. This thesis has, for the first time, mapped the organisation's administrative infrastructure within the capital.

Like many organisations, SOE controlled its operations from a centralised locality which was, inevitably, London. Although it is well known that the organisation was based at 64 Baker Street, what is not generally appreciated is their wider property portfolio (*Figure 113*). Within the city, SOE's Command and Control was not uniformly or randomly distributed, but rather clusters developed.[3]

[3] Certain restrictions were placed on where SOE could establish office accommodation by competing demands for space in central London. Despite the increasing danger, military, governmental and

Figure 114: 64 Baker Street, home to SOE's headquarters throughout the Second World War. This road became central to the organisations command and control operations. In the immediate vicinity, SOE acquired numerous properties.

One of the first offices SOE established after gaining their independence was located at 64 Baker Street, Marylebone (*Figure 114*).[4] As the war progressed, Baker

private companies still needed access to Whitehall to lobby. These organisations were all competing for access to finite real estate. Certain neighbourhoods were also exclusive; for example, St James' Parish, home to four of the most exclusive clubs in the West End, Boodle's, Brooks's. White's and Crockford's (Jane Rendell, 'The Clubs of St. Jame's; places of public patriarchy – exclusivity, domesticity and secrecy', *The Journal of Architecture*, 4.2 (1999) p. 168). At the time, Mayfair was one of the most fashionable areas of London (Youssef Cassis, 'Financial Elites in Three European Centres: London, Paris, Berlin, 1880-1930s', *Business History*, 33.3 (1991)). Property within Belgravia and Pimlico was also highly fashionable. Another region avoided by the Secret Services was Soho. This was an area notorious for sex workers and a prevalent criminal underclass (Allan Collins, 'Sexual Dissidence, Enterprise and Assimilation: Bedfellows in Urban Regeneration', *Urban Studies*, 41.9 (2004) p. 1796).

[4] Roy Berkeley, *A Spy's London* (London, 1994) p. 173

Street, and its immediately vicinity, were to become increasingly important for running the organisation. Conveniently sited near to Whitehall and with access to the London Underground, this location also had the advantage of being isolated from SIS's headquarters at 54 Broadway Building.[5] Geographically, SOE were separating themselves from their parent organisation.[6]

Aside from the various offices centred on Baker Street, SOE established four further clusters of accommodation within London which were generally comprised of 'safe houses'.[7] These were often single rooms within hotels vetted by SOE which could be rented on a nightly basis.[8] It was inevitable that the greatest concentrations of safe houses were located in areas associated with pre-war hospitality (*Figure 115*). These clusters were also sufficiently distant from SOE's offices on Baker Street. This provided the organisation a security barrier by compartmentalising their activities within London. To ensure agents did not have to visit their main offices, SOE established satellite facilities in proximity to the safe houses. This enabled the organisation to hide certain aspects of their activities from the agents.

The nature of office accommodation within London meant SOE's facilities were indistinguishable from their surroundings. In an effort to draw attention away from the wide variety of activities they were involved in, the organisation adopted a number of cover names. One of these was the 'Inter Services Research Bureau'. This provided their staff, who came from all three branches of the armed services, a degree of anonymity. One aspect of SOE's Command and Control operations which was, however, unique to the organisation was the utilisation of the Natural History Museum as 'food for thought'.

[5] Access to the Bakerloo Line offered SOE ease of access to London Paddington Station as well as King's Cross St Pancras and London Euston. This provided their staff with access to a convenient form of transportation to visit their facilities located throughout the UK. Proximity to Whitehall also allowed SOE to have personal contact with government representatives. Accommodation within the War Office and in Room 98 Horse Guards provided the organisation with instant access to Whitehall and the opportunity to lobby the case for clandestine warfare.

[6] This segregation was mirrored at RAF Tempsford. See p. 182.

[7] SOE's safe houses in Belgravia were in close proximity to properties occupied by various governments in-exile and other foreign organisations. By locating accommodation for agents awaiting deployment in this area, SOE provided their allies the ability to be involved with their briefing and debriefing.

[8] Each Country Section was allocated specific hotels which could be used as safe houses. SOE also retained a number which they always held in reserve (TNA HS 8/335 London Hotels pp. 1-3).

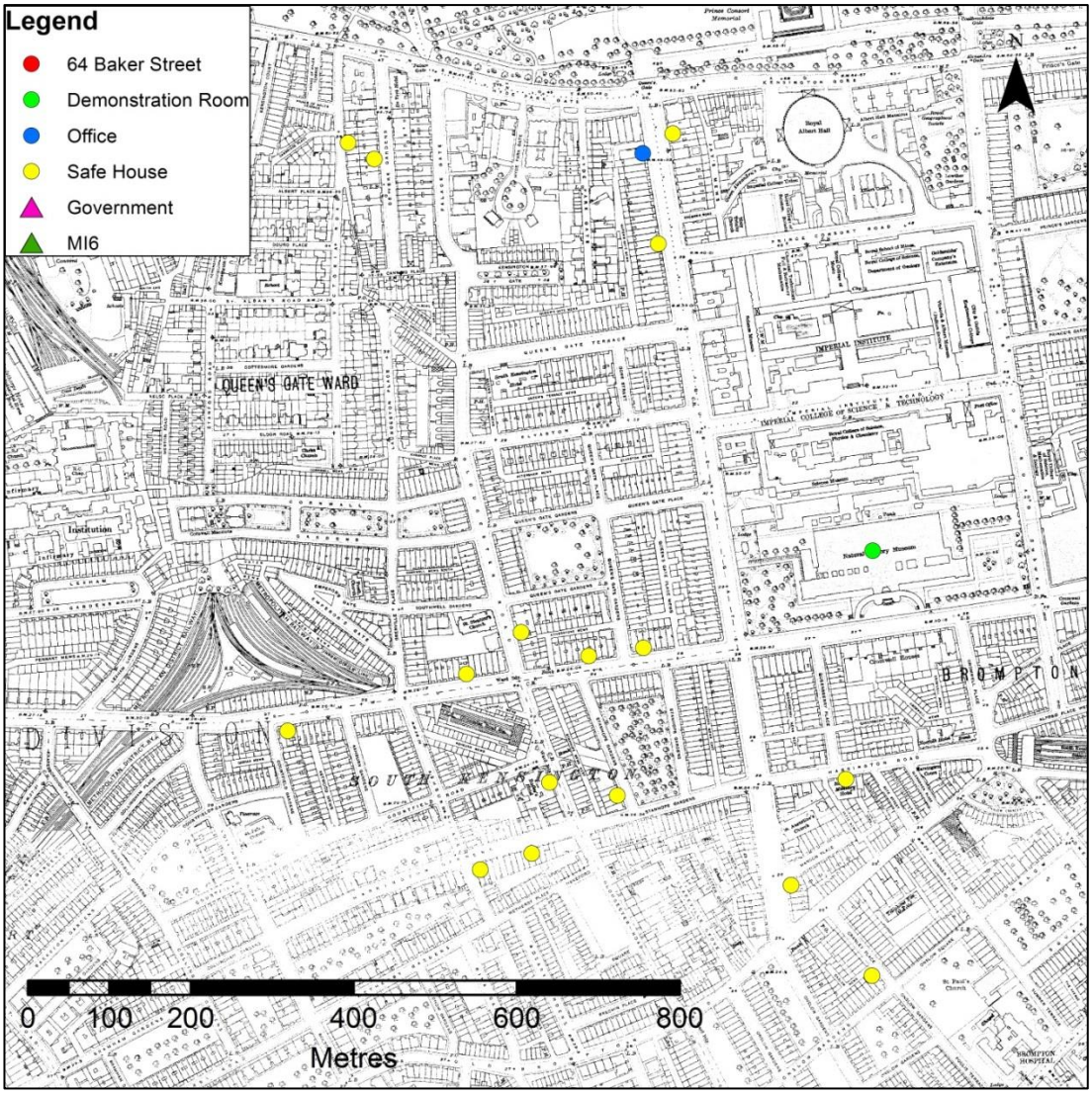

Figure 115: SOE clustered their 'safe houses' in areas of London traditionally associated with hospitality. 'Safe houses' were established in rooms in hotels which could be rented on a nightly basis. Nearby, SOE also established office accommodation. This ensured that SOE did not have to inform their agents of the location of their headquarters.

Station XVB, The Natural History Museum

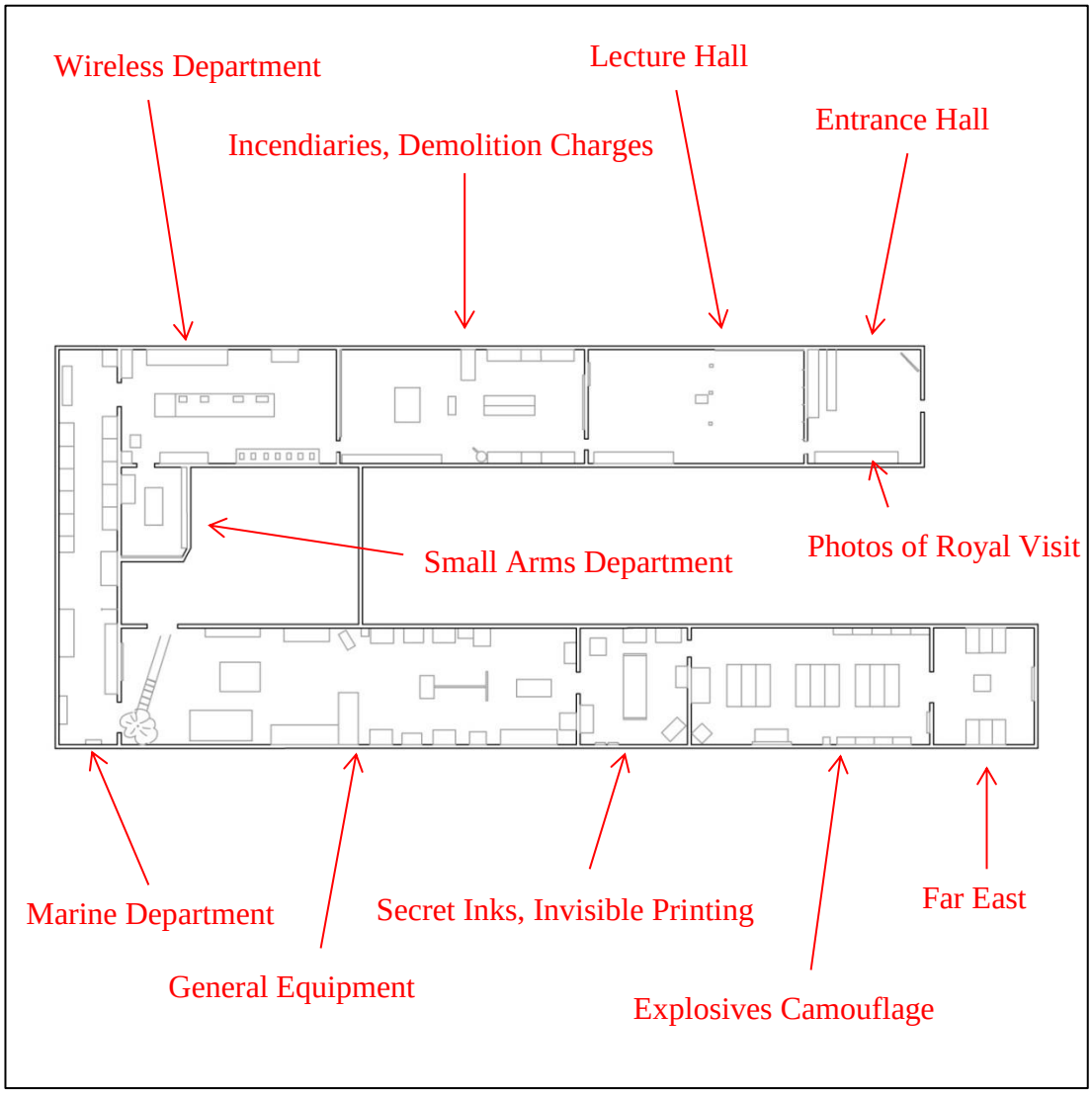

Figure 116: The floor plan of Station XVB located within the Natural History Museum, Kensington.[9]

Within SOE, it was decided that in 'order that the Agent should receive every possible help and avail himself of "food for thought", a Demonstration Room was [to be] formed … This exhibition contained not only examples of the many facilities available from camouflage, but examples of all the devices produced by the AD/Z [Supplies] Directorate'.[10] At 17:00 on 8 July 1943, this new facility was opened

[9] TNA HS 10/1
[10] TNA HS7/49 History and Development of the Camouflage Section p. 3

within the Natural History Museum, Kensington (*Figure 116*).[11] For this event, SOE had sent invites to Churchill's Intelligence Advisor Desmond Morton, the Director of Military Operations (DMO), the Director of Naval Intelligence (DNI) and Marshall-Cornwall who liaised between SOE and SIS.[12] This list of dignitaries reflects the underlying political motivation of SOE when establishing this facility.

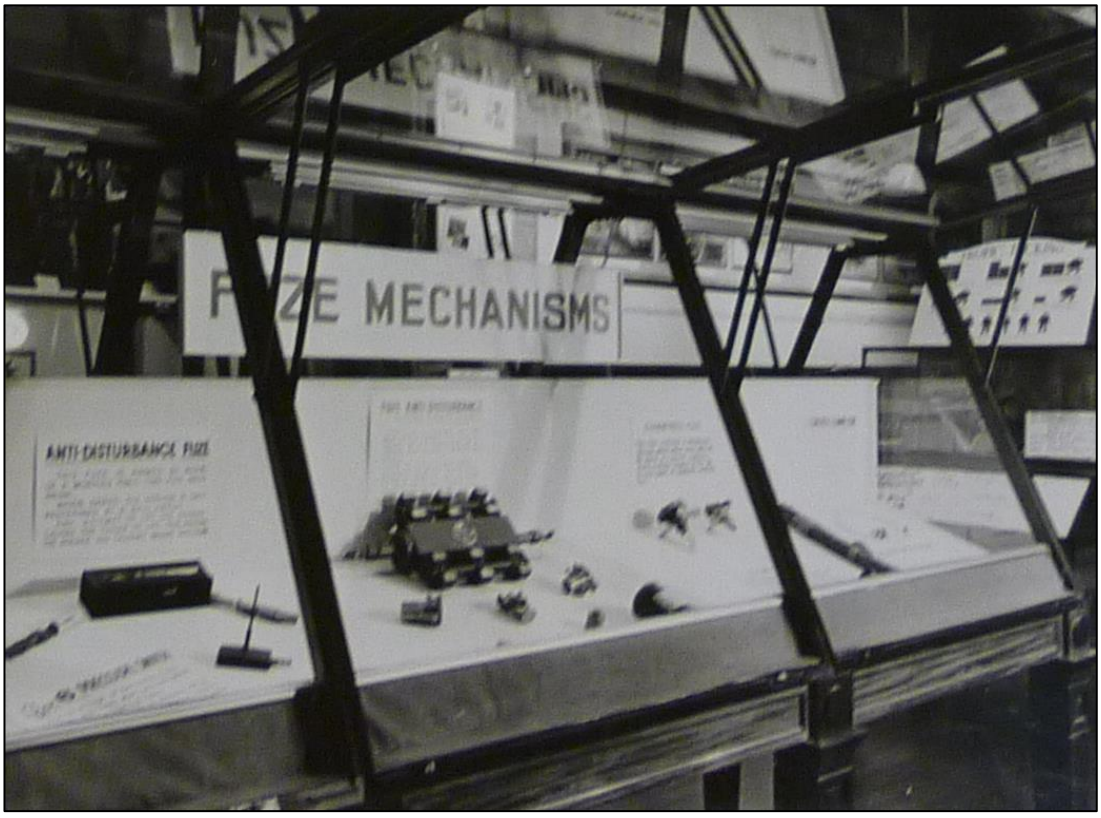

Figure 117: Exhibits within SOE's Demonstration Room were kept behind glass restricting the agent's ability to handle the items. As agents would be operating under highly stressful conditions, previous handling of equipment would enable them to develop automatic reflexes. By seeing objects behind glass, they would only be able to develop a theoretical knowledge of how they work. In an operation scenario this would have serious negative implications on the probability of success.[13]

[11] On the establishment of a Demonstration Room, SOE was already operating a small camouflage section in the nearby Victoria and Albert Museum. In the immediate vicinity was the Royal College of Arts, the Royal College of Science, the Geological Museum, the Science Museum, the Natural History Museum, the Royal College of Science, Physics and Chemistry, Imperial College London. This neighbourhood was also home to a substantial number of SOE's 'safe houses'. The use of the Natural History Museum as a Demonstration Room was logistically suited to agents undergoing briefing in the nearby hotels.
[12] TNA HS HS 8/336 CD/5577 05/07/1943
[13] TNA HS 10/1

The nature and layout of SOE's facility within the Natural History Museum indicates that this was intended as more than just simply 'food for thought'. Most evidently, the establishment of a 'Demonstration Room' for agents awaiting deployment undermined SOE's proven training regime centred on the STSs. Moreover, by placing exhibits behind glass, the agents' ability to handle and interact with the items on display was severely restricted (*Figure 117*). Within this facility, the only space available for teaching was a small lecture theatre (*Figure 118*). Although for certain aspects of instruction this was invaluable, lectures were poor substitutes for hands on experience of learning new equipment.

Figure 118: View across the lecture hall established in SOE's Demonstration Room.[14] *It was only through the support of Churchill that SOE survived the various attempts by other organisations to undermine their authority. By placing Churchill's portrait in an obvious position, the organisation was demonstrating their political backing.*

Whilst undergoing final briefings, agents were likely to be in a heightened state of nervous tension. Under such mental conditions, providing them with 'food

[14] TNA HS 10/1

for thought' would be counterproductive as they were unlikely to be malleable to new equipment. Unlike the STSs, the Demonstration Room was not a practical learning environment for this stage of an agent's career. Station XVB was, therefore, established as a cover.

Figure 119: Certain items which were on display at the Demonstration Room would have been familiar to the agents. If agents were unaware of parachuting equipment prior to their final briefing, SOE's training regime would have been fundamentally flawed.[15]

The nature of the exhibits SOE displayed within Station XVB was also unusual (*Figure 119*). These items should have already been familiar to those agents awaiting deployment. If they were still not aware of this basic equipment, the STSs would have fundamentally failed in their purpose. Many of the exhibits were simply superfluous. Agents destined for France were unlikely to be interested in contemporary Norwegian fashion. The dedication of a room to the Far East was also entirely irrelevant to those deployed to mainland Europe.[16] By providing agents with an awareness of the wide range of equipment produce by SOE, the organisation was

[15] TNA HS 10/1

[16] Agents operating in the Far East theatre received training from SOE's mission in India. This allowed the organisation to provide tailored instruction within the environment in which the agents would be operating.

compromising the security of their missions. Captured agents could now provide German counterintelligence with details of SOE's operational procedures (*Figure 120*).

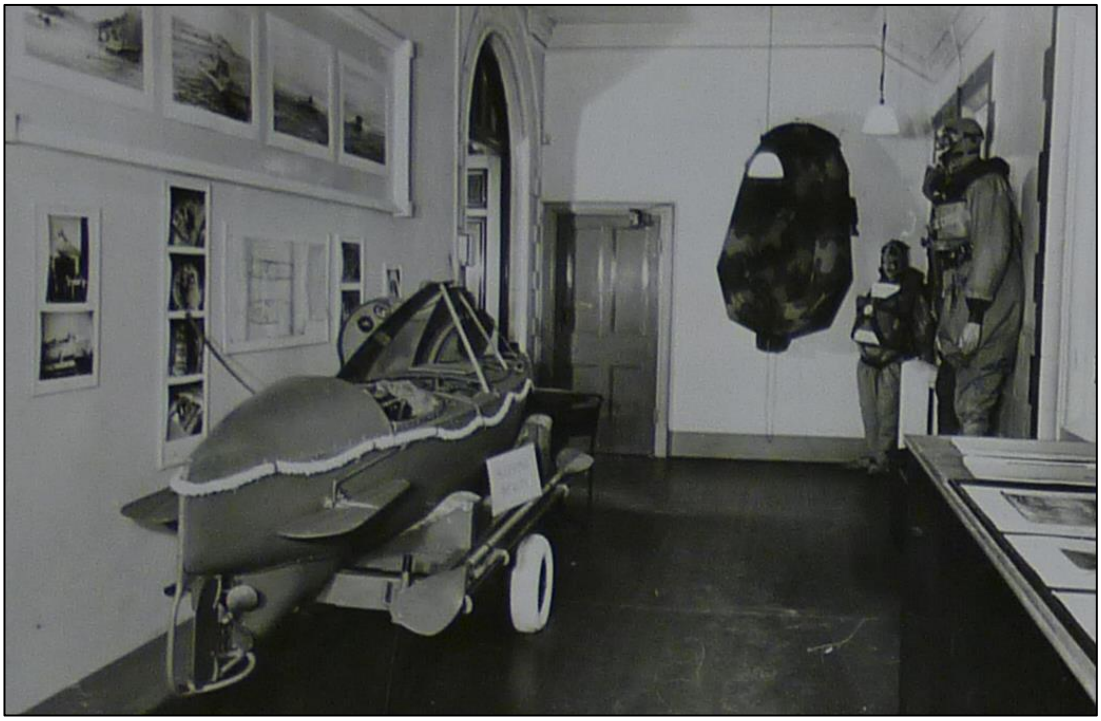

Figure 120: A security precaution employed by the Secret Services was the restriction of knowledge. The establishment of a 'Demonstration Room' by SOE undermined these security measures. Knowledge of submersible vehicles, for example, was not required by the majority of agents. Those who needed to know about this equipment had already undergone training.[17]

The nature of the equipment on display, the creation of dioramas (*Figure 121*) and the grandeur of the Natural History Museum, indicates that the Demonstration Room was intended for an audience other than SOE's agents.[18] Despite being located in the vicinity of 'safe houses', Station XVB was intended as a political tool. It was the development of innovative equipment specifically designed for clandestine warfare which made SOE distinguishable from other branches of the Secret Services. By creating a demonstration room, the organisation was championing tangible items

[17] TNA HS 10/1
[18] The fate of SOE's exhibits at the Natural History Museum is uncertain.

which could be solely attributed to SOE (*Figure 122*). This space provided SOE the ability to entertain dignitaries and demonstrate the organisation's capabilities.[19]

Figure 121: The construction of dioramas within the Demonstration Room was superfluous. If this facility was intended for agents, a hands-on approach to the exhibits would have been more advantageous.[20]

Within this chapter, the nature of SOE's Command and Control infrastructure has been discussed. This support structure enabled the organisation to coordinate operations and collaborate externally. In the following chapter, all aspects of SOE's UK property portfolio will be drawn together to illustrate how they supported the operations of two agents.

[19] In March 1945, Station XVB held a Royal visit when King George V inspected the facility. Photographs from this visit were displayed in the entrance hall of this facility. A portrait of King George V also hung in this room surrounded by the flags of the Allied nations. Above this picture, SOE painted 'We Encompass The World' onto the wall.
[20] TNA HS 10/1

Figure 122: The overt display of SOE's achievements at Station XVB was intended for a political audience. Data regarding the supplies SOE had shipped to the resistance would not have been relevant information for agents awaiting deployment.[21]

[21] TNA HS 10/1

CHAPTER IX
SOE's Agents

Up to this point, the focus of this thesis has been on SOE's neglected UK based property portfolio. One of the fundamental tenets of this research is that a more balanced consensus of SOE's operations can be gained through analysis of the organisation's infrastructure. Without an appreciation of SOE's training regime, research and development, transportation, communications and command and control, assessments of operations cannot be accurately undertaken. The entire purpose of SOE's property portfolio within the UK was to support the activities of its agents in the field. In this chapter, the operational life of Albert Robichaud and Max Manus will be examined within the context of SOE's infrastructure. This will draw together the various aspects of the organisation's UK based activities into a coherent narrative.

Albert Robichaud

Born on 18 February 1916 in Cabano, Canada, Albert Robichaud was the son of a Canadian father and American mother.[1] After receiving an excellent education, he had become a school master teaching French Literature and Latin by 23. In 1941, Robichaud joined the US Army where he was regarded as 'quiet, unassuming and rather colourless and does not appear to have any qualities of leadership'.[2]

Shortly thereafter, Robichaud was recruited into the OSS and trained to work as a Jedburgh.[3] After being seconded to SOE's Section RF, no suitable role could be identified.[4] Despite this set back, F Section were willing to employ him if he passed

[1] TNA HS 9/1270/2 27FFC OB.102 Pg1. Robichaud had taken American nationality.
[2] TNA HS 8/176 From D/F 13/01/1944 p. 1
[3] Jedburgh teams comprised of three men made up of British, American and French personnel who infiltrated France prior to Operation OVERLORD to prepare the way for the invading forces. In order to train these agents, SOE and the OSS established a facility at Milton Hall, Cambridgeshire. This site was known as ME65.
[4] TNA HS 8/176 From D/F 13/01/1944 p. 1 SOE's RF Section worked with General de Gaulle's Free French Forces.

his medical.[5] On passing these tests, Captain Benn became responsible for arranging his paramilitary training, conducted at STS50 Gorse Hill, parachute instruction at RAF Ringway, and lessons in 'passing', conducted in Beaulieu (*Figure 123*).[6]

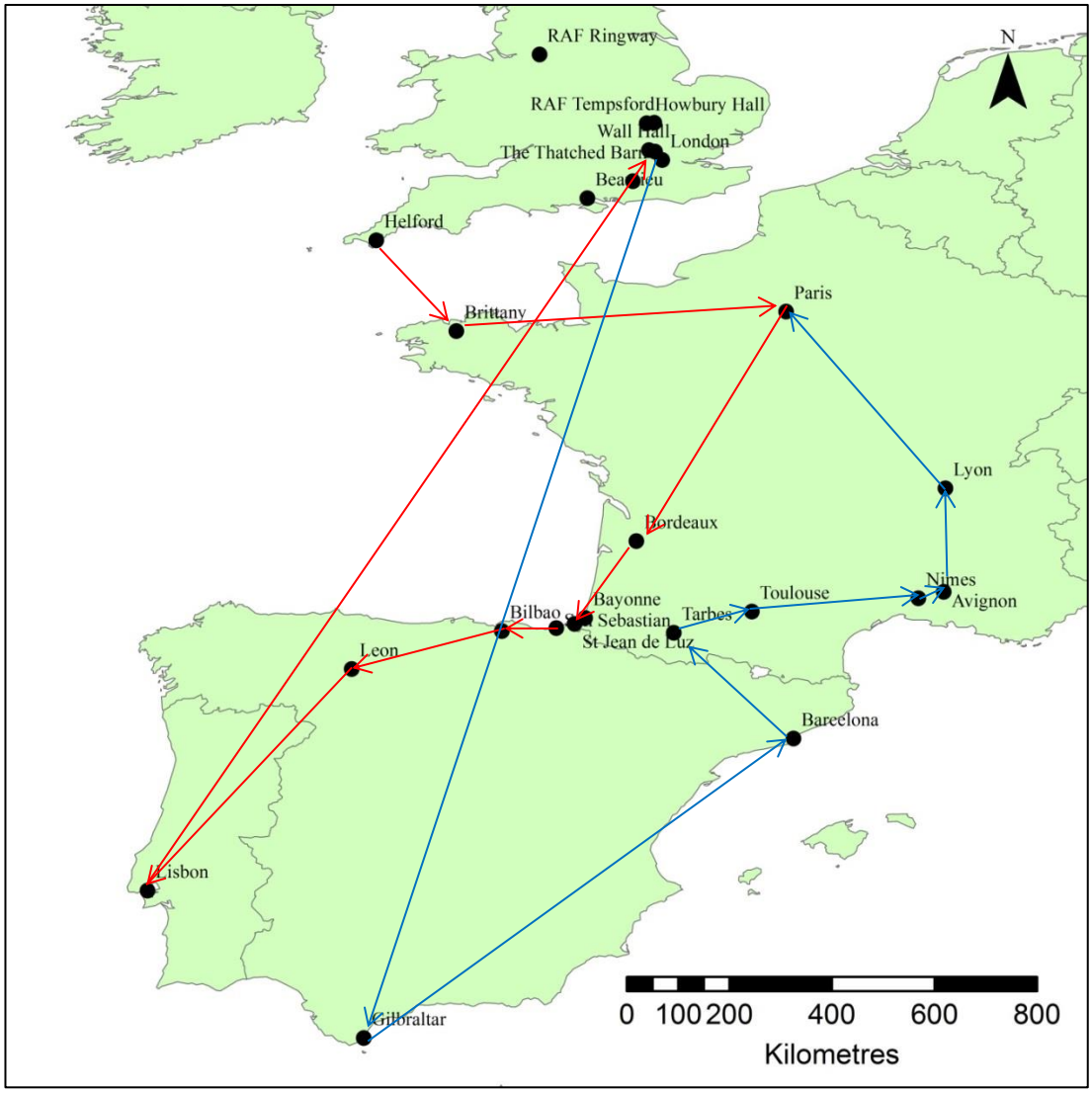

Figure 123: A map of Albert Robichaud's operational life with SOE. His first mission is mapped in red, his second in blue. The facilities established by SOE within the UK were central to the success of Robichaud's missions. They provided him with training, equipment, transportation and communication. All these aspects of the support provided by SOE were coordinated by the organisation's command and control infrastructure.

[5] TNA HS 8/176 From D/F 13/01/1944 p. 1. SOE's F Section operated independently of the Free French Forces in France.
[6] TNA HS 8/176 RFT/999 13/01/1944

On 16 January 1944, Robichaud arrived at STS50 with group 27FFCOB102 for paramilitary instruction. During his time there, he was regarded as a 'cheerful and intelligent character who has worked well during the week he has been here. Has gone away with a sound knowledge of all subjects … [However, he was] afraid of getting wet'.[7] By 23 January 1944, he was being billeted in Dunham House in preparation for his parachute training at STS51. There he was joined by FANY Heim, Lieutenant Fraser and Captain Rees for six days of ground based instruction which was provided by Miss Daniels.[8] Despite being regarded as a 'rather youthful immature student who spent much of his time in the company with the F.A.N.Y's.', he successfully completed his two jumps and graduated from RAF Ringway.[9]

Joining group 27FFC, Robichaud relocated to Beaulieu for his 'finishing' training. Here he gave the impression of being 'below the average in intelligence and rather more practical than academic. He is slow, rather scatterbrained and lacking in shrewdness and cunning … [and] He has no powers of leadership and should be employed, if at all, in a very minor capacity under strict supervision'.[10] Based on his training reports, SOE decided Robichaud could be suitably employed as a 'guinea pig'.[11]

On the night of 21 March 1944, Robichaud, codenamed ROBIN, was transported by sea and successfully infiltrated into the north coast of Brittany.[12] His orders were to test the newly established CHERUB Circuit by using this network to leave France.[13] After moving between two safe houses that night, ROBIN left for Paris the following day. As his train to Bordeaux did not leave until the evening, he managed to fit in some sightseeing. Arriving later than expected at his destination, ROBIN was left to his own devices to locate the address of his contact, M Renard. When he arrived at the safe house, he was informed that his other contact, Benito, had left after he had waited two weeks for his arrival. The following morning Benito arrived and his fears that ROBIN was a Gestapo agent were dispelled after he

[7] TNA HS 8/176 Para-Military Report p. 1-2
[8] TNA HS 8/176 Parachute Training Report – Most Secret p. 1
[9] Ibid p. 1
[10] TNA HS 8/176 Finishing Report p. 1
[11] TNA HS 8/176 From D/FB 08/03/1944
[12] TNA HS 8/176 DF/REC/5288 20/04/1944. ROBIN was attached to Operation DULVERTON to cross the English Channel (TNA HS 8/176 5097 03/04/1944).
[13] The CHERUB Circuit had been formed to enable the passage of people and messages between Bilbag, Spain, and Bordeaux, France, a distance of approximately 339km (TNA HS 8/176 Operational Orders for Robin 17/03/1944 p. 1).

successfully used the agreed passwords.[14] He was now ready to begin his journey on the CHERUB Line.

The first section of his journey required ROBIN to catch the midnight train to Bayonne that Sunday.[15] On arriving at his destination, ROBIN and Benito continued towards St Jean de Luz by foot. Just outside Biarritz, the pair boarded another train for the remainder of the journey to St Jean de Luz. Over the next couple of days, ROBIN and Benito were accommodated in various safe houses in the area whilst they prepared to cross the Spanish border.[16]

Eventually crossing into Spain in the early hours one morning, ROBIN and Benito continued their journey cross country to avoid sentries. After travelling between safe houses and receiving lifts from local contacts, they eventually reached San Sebastian. Staying there for four days whilst arrangements were made, the pair finally border a train for Bilbao and at 11:00 on 29 March 1944 reached their destination and the end of the CHERUB Line.[17]

On successfully completing his first mission, SOE now ordered ROBIN to test the CELINI Line which ran from Bilbao to Lisbon, Portugal.[18] His new guide presented himself at a bus stop on 5 April,[19] but they could not begin their journey until new papers and clothing had been acquired. On 11 April they managed to catch the 19:00 train to Leon following an altercation with the ticket inspector. After a travelling by train, bus and foot they eventually reached Barcencia where George Montal, the head of the local network, arranged for the pair to catch the train to Lisbon the following evening. Once they reached Lisbon, the British Embassy arranged ROBIN's transportation back to the UK. At 23:00 on 18 April 1944, ROBIN boarded a plane destined for Britain using the cover name of Joseph Albery Roberts.[20]

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[14] TNA HS /176 Interrogation of Robichaud, Albert @ Robin (Field Name) 29/04/1944 p. 3

[15] As stricter controls were expected on the Saturday, the decision was taken to travel on the Sunday. As this section of the journey required specific papers ROBIN could not obtain, they left their luggage behind in Bordeaux to be carried by a courier on the next train (TNA HS /176 Interrogation of Robichaud, Albert @ Robin (Field Name) 29/04/1944 p. 3).

[16] TNA HS /176 Interrogation of Robichaud, Albert @ Robin (Field Name) 29/04/1944 pp. 3-4

[17] Ibid pp. 4-5 and TNA HS /176 DF/REC/5288 20/04/1944

[18] TNA HS /176 DF/REC/5288 20/04/1944

[19] ROBIN was instructed to visit the bus stop, carrying under his arm a newspaper, where a man would ask him in English for a match, in return ROBIN was to provide him with a match box. This security check ensured both parties knew who they were dealing with.

[20] TNA HS 8/176 Report on Robichaud pp. 1-2

Following his arrival back in the UK, Robichaud immediately underwent a series of interrogations and debriefings. The intelligence gathered from these was used by SOE to plan future operations in the region. Once these were completed, the organisation enrolled Robichaud onto further training sessions.[21]

Joining party 27.OB at STS39, Wall Hall, Robichaud received training in micro-photography where he exhibited a sound knowledge of copying documents, using different cameras and films, working under field conditions.[22] Robichaud was also sent on a three day reception committee course at STS40, Howbury Hall.[23] Here, his instructors felt that he worked 'well and has a very good all round knowledge. He should not have any difficulty in organising and controlling this type of operation'.[24]

Based on his instructors' feedback, SOE decided to send Robichaud to France via Spain to be in charge of the JESCHKE Circuit's carrier pigeon service.[25] For his new assignment, he was issued 100ft (30.48m) of microfilm, two Leica cable releases, one reel of cellophane, one pair of scissors, a No. 1 lens and 250,000 francs.[26] In order to disguise the equipment, Station XV, The Thatched Barn, was ordered to manufacture a custom made seed box in which all the items could be concealed.[27] On 26 June 1944, Robichauld boarded plane UG25 for Gibraltar using the cover name of 2nd Lieutenant Stephen Maitland.[28] His orders were to 'proceed to FRANCE to act as one of JUANITO's lieutenants, to operate under his orders a mail pigeon service from FRANCE to U.K.'.[29]

The day after arriving in Gibraltar, ROBIN travelled to Barcelona by car where he was delayed for two weeks as members of the line into France had been arrested. On 11 July, ROBIN, joined by fellow agents JUANITO and Lawrence, left Barcelona by car accompanied by two guides. After covering 250km they had to continue their journey by foot as it was no longer safe to travel by road. During this hike, Lawrence fell behind and was lost. The group, however, pressed on and finally stopped for a break at 23:00 on 13 July.[30]

[21] TNA HS 8/176 DF/OPS/5613 19/05/1944
[22] TNA HS 8/176 Finishing Report 19/05/1944
[23] TNA HS 8/176 FVS/9142 21/06/1944
[24] TNA HS 8/176 Short Three Day Reception Committee Course 26/06/1944
[25] TNA HS 8/176 DF/OPS/5613 19/05/1944
[26] TNA HS 8/176 DF/5944 10/06/1944
[27] TNA HS 8/176 Form CAM.1.A 20/06/1944
[28] TNA HS 8/176 Air Passage 22/06/1944
[29] TNA HS 8/176 Operation Orders for ROBIN 24/06/1944 p. 1
[30] TNA HS 8/176 Interrogation of Robichaud – 28th Sept. 1944 pp. 1-2

Over the following days, the group had to keep to the top of valleys and the mountain routes to avoid sentry posts. When they finally descended, they were met by a new guide who had disguised himself as a fisherman.[31] After following the road for some time, they were approached by a car driven by the *Maquis* who offered to give them a lift to a nearby hotel. They then continued their journey to Tarbes by bus and car where they were introduced to Edouard who agreed to accompany them to Paris.[32]

Before they could depart, Edouard identified errors in ROBIN's papers which SOE had supplied. They, therefore, had to wait until the circuit's documents experts could provide new ones. Taking the bus to Toulouse, the group were delayed for 8.5 hours as a bomb had destroyed the train line to Nimes. As the repairs were predicted to take two days, Edouard persuaded the driver of a mail van to take them to Avignon. Whilst travelling to this city, they were accompanied by a Gendarme whose presence meant they were not searched at checkpoints.[33]

Continuing on their journey they reached Lyon where they were forced to wait until they could board a train heading north. As they approached the demarcation line, a Gestapo checkpoint stopped the carriage to check the passengers' papers. Eventually reaching Gare de Lyon, Paris, they proceeded to Gare d'Austerlitz to catch the Metro to Montparnasse. From here they were taken to No. 4 rue Bertrand. Over the next 13 days, ROBIN was moved between three further safe houses.[34]

Whilst operating in Paris, ROBIN was provided with a radio which had been parachuted into France for use by the circuit. One of the tasks allocated to ROBIN was to identify suitable landing grounds and drop zones for a new circuit JUANITO was establishing in the region. Despite locating a number of potential sites, ROBIN was forced into hiding by the advancing Allied troops.[35] Over this period, he did, however, manage to direct downed airmen through the circuit's escape routes.[36] On 5 September 1944, ROBIN was finally liberated by the Allied forces.[37] By the end of

[31] The guide was actually a French champion skier who was trusted by the Germans and was, therefore, in a position to know troop movements along the road.
[32] TNA HS 8/176 Interrogation of Robichaud – 28th Sept. 1944 pp. 2-3
[33] Ibid pp. 2-3
[34] Ibid pp. 3-4
[35] TNA HS 8/176 Appendix to Interrogation of Robichaud, Albert
[36] TNA HS 8/176 Activity Report of Lt Albert Robichard 15/10/194 p. 6
[37] TNA HS 8/176 CE.10 12/09/1944

the month he had returned back to the UK.[38] For his actions, Robichaud was mentioned in dispatches as he:

> 'not only made the [escape] line safe for evaders, but he broke all records for speed by being back in this country in less than a fortnight of his departure. The journey across the Pyrenees and Estrella Mountains into Portugal entailed great hardship, and it is a magnificent tribute to his great powers of endurance and determination that Lieut. Robichaud was able to accomplish his mission with such outstanding success in so short a space of time. Lieutenant Robichaud was sent on a second mission to France in June 1944 and although the intervention of D-Day curtailed his activities, Lt. Robichaud again showed the same spirit of determination by reporting to his organiser in Paris after travelling through enemy-held areas'.[39]

Max Manus, DSO, MC and Bar

Born on 9 December 1914 in Bergen, Norway, Max Manus was the son of a Norwegian father and Danish mother. During his childhood, he was to live in Copenhagen and Cuba finally returning to Europe in 1930. When the Winter War broke out in January 1940, Manus travelled to Finland and volunteered to fight the Russians. He returned to Norway on 15 April 1940, three days after the German invasion, with 130 compatriots and formed a guerrilla company which operated in Kongesvinge and Brumendal. This unit was disbanded on 15 May 1940.[40]

After Norway surrender, Manus, who was operating under Major Helseth, began stockpiling weapons. Following a security breach by a member of his network, Manus was confronted by the Gestapo on 16 February 1941.[41] Fearing he knew too much, Manus 'decided to take a risk and, drawing the attention of the six men to some sporting trophies in the room, he quickly jumped through the window. His

[38] TNA HS 8/176 7099 29/09/1944
[39] TNA HS 9/1270/2 Army Form W.3121 pp. 1-2
[40] TNA HS 9/986/2 4381 MANUS, MAX 13/12/1941 pp. 1, 3
[41] Ibid pp. 3, 4

apartment was on the second floor. He remembers no more until he recovered consciousness in the ULLEVOL Hospital'.[42]

On getting word of his capture to his network, Manus began planning his escape from the hospital. On 13 March 1941, he made his attempt by lowering a fishing line out of the window. Waiting at the bottom was a friend who attached a rope which Manus pulled up and then climbed down. .[43] In order to avoid 'reprisals against the nurse, he had arranged with the doctor that the nurse should receive some facial injection which would cause her face to swell and, in addition, the doctor should discolour the skin in such a way as to make it appear that MANUS had overpowered the nurse'.[44]

Following his escape, Manus travelled to the UK via Sweden, Finland, Russia, Turkey, Egypt, Cape Town, Trinidad and Canada finally arriving in Belfast on 9 December 1941.[45] During his interrogation, he was regarded as a 'young adventurer, but there is no question at all of his loyalty and one cannot but admire his work and the risks he has taken to avoid falling into the hands of the Gestapo. He has been commissioned into the Norwegian Army … [and] I recommend that he be released to [SOE] Norway House Immediately'.[46]

In January 1942, Manus began his training at STS3, Stodham Park, where he was deemed the 'comedian of the party and very popular with the rest of the crowd. He is very keen and intelligent and has also plenty of sound common sense'.[47] After successfully completing this course, Manus relocated to STS24, Inverie House, where he demonstrated an expert knowledge of the weapons and tank traps used in the Finno-Russo war.[48] During his training, he also attended courses at STS51, RAF Ringway, STS33, The House on the Shore, and STS26, Inverlochy Castle.[49] On 28 February 1943, he began his final stage of instruction by attending the Finishing Schools at Beaulieu.[50]

[42] TNA HS 9/986/2 4381 MANUS, MAX 13/12/1941 pp. 4-5
[43] Ibid p. 5
[44] Ibid p. 5
[45] TNA HS 9/986/2 450/4942 Manus, Max 2/Lt p. 1
[46] TNA HS 9/986/2 4381 MANUS, MAX 13/12/1941 pp. 1, 7
[47] TNA HS 9/986/2 450/4942 Manus, Max 2/Lt p. 2
[48] Ibid p. 2
[49] TNA HS 9/986/2 Manus, Max Party 26N p. 2-3
[50] TNA HS 9/986/2 Training p. 1

Whilst stationed in the UK, Manus began planning an operation to destroy ships from canoes using specially constructed charges.[51] On 12 March 1943, Manus and Corporal Gregers Gramm were parachuted into Norway, east of Oslo. Almost immediately Operation MARDONIUS suffered setbacks as Manus developed a severe bout of pneumonia. Initially finding it difficult to enrol volunteers, the operation was further delayed as there was a shortage of suitable targets combined with a long spell of bright nights. On 28 April 1943, conditions were finally suitable for an attempt to be made on sabotaging shipping. Despite the moon illuminating the water, the group still managed to place their charges and sink two ships and damage a third.[52]

Returning to the UK on 24 May 1943, Manus was posted back to STS26 to resume his duties of training students in paramilitary skills. Five months later, he was billeted at Station 61, Gaynes Hall, prior to his despatch to the field on his next operation.[53] Returning to Oslo on Operation BUNDLE, Manus was 'charged with the dual role of continuing ship sabotage when opportunity offered, and particularly, of subverting enemy troops by the distribution of leaflets, posters and other clandestine methods'.[54]

During this mission, Manus produced a series of publications which had a considerable impact on German morale. He also made several attempts at destroying sabotaging ships which came into his area of operation. One target he destroyed was the MONTE ROSA to which he attached a string of limpets. This ship sunk as she was leaving Oslo with 3,000 German troops aboard. Manus was also involved in three attacks on Norwegian employment records, assisted in the destruction of aircraft undergoing repairs and was involved in the attack on the Vacuum Oil Company storage depot at Sorenga.[55] For his involvement in Operation BUNDLE, Manus was awarded a bar to his Military Cross.

One of Manus' greatest achievements came when he destroyed the transport ship DONAU. When she arrived in Oslo harbour on 15 January 1945, it was immediately decided that an attempt should be made to sabotage her. Despite ice in

[51] TNA HS 9/986/2 Fenrik Max Manus, Royal Norwegian Army Recommendation for Award
[52] Ibid. For this, Manus was awarded the Norwegian War Cross with Sword, the highest ranking Norwegian gallantry decoration, and the British Military Cross (TNA HS 9/986/2 Remarks).
[53] TNA HS 9/986/2 Training p. 1
[54] TNA HS 9/886/2 Recommendation for the award of a bar to the MC to Fenrik (L/Lieut) Max Manus MC RNA p. 1
[55] Ibid pp. 1-2

the harbour and a search being conducted for a soldier who had fallen into the water, it was decided to continue with the plan. To smuggle the cordex past the guards, Manus and his colleague Roy Nielsen wrapped 100m of the cord round their bodies.[56] As they approached the checkpoint, a pre-arranged comedy was staged: 'It was slippery with ice, and when he came up to the guard, Nielsen, who is over 6 feet, skidded and fell backwards to the great amusement of everyone. As a result the examination of papers was of a very cursory nature'.[57] The pair then managed to attach 11 limpets to the side of the DONAU. As they were leaving, the ROLANSECK arrived to which they returned to attach their remaining limpet.[58]

At 22:00 that evening, as the DONAU was sailing past the coast of Drobak, the charges detonated and she sunk in 25m of water. The explosion destroyed several hundred vehicles, 300 horses and killed an unknown number of elite Alpine troops. Despite an immediate search of the ROLANSECK being conducted, the limpet was not discovered and it later blew a hole in the side of the ship.[59]

Escaping Oslo after this mission, Manus arrived in Stockholm on 29 January 1945 where he remained until 1 March 1945 when he was ordered back to Norway.[60] Two months later on 7 May, the German forces in Norway surrendered. On 7 June King Haakon VII returned to Oslo and was accompanied by Manus who had 'established himself high in the Crown Prince's favour, who regards the trio Fjeld (no.24), Max, and Martin Olsen as the guardians of the Royal Family!'.[61]

The missions of Max Manus and Albert Robichaud are examples of a small selection of the wide range of operations undertaken by SOE throughout the Second World War. These demonstrate what could be achieved by the organisation's agents when the various components of SOE worked effectively and in unison. In the following chapter, themes which have run through this thesis will be drawn together in a conclusion.

[56] TNA HS 9/886/2 Recommendation for the award of a bar to the MC to Fenrik (L/Lieut) Max Manus MC RNA p. 2
[57] Ibid p. 2
[58] Ibid pp. 2-3
[59] Ibid pp. 3-4. Manus and Nielsen were responsible for sinking a 9,000 ton German transport, and disabling another of nearly 2,000 tons. For this action, Manus was awarded the Distinguished Service Order.
[60] TNA HS 9/986/2 Training p. 1
[61] TNA HS 9/1605/3 Diary of Scandinavian Tour by Colonel JS Wilson OBE pp.2, 3

CHAPTER X
Conclusion

This thesis has, for the first time, assessed the property portfolio belonging to one of Britain's wartime Secret Services. As access to SOE's archive is hampered by the post-war destruction of files, the organisation's infrastructure provides a tangible resource for reassessing their legacy. This chapter draws together the reoccurring themes which have been identified throughout this thesis.

1942, a Changing Political Environment and the Growth of SOE

In the history of SOE, two years were central to the development of the organisation: 1940, the year it was formed, and 1942, when political support was more forthcoming. SOE was only established in July 1940, two months after Germany had invaded France, by amalgamating Section D, MI(R) and Department EH. Prior to this, there was little political incentive to conduct operations of a clandestine nature. Those countries which had been occupied were inconveniently located for the UK to materially support their emerging resistance networks.[1]

Following the evacuation of the British Expeditionary Force (BEF) from Dunkirk in May 1940, the Allies' ability to instigate unrest in occupied Europe became a strategic priority. Early attempts by SOE to conduct operations were generally of an amateurish nature and the majority inevitably failed. It was a result of these failures that the organisation developed a bad name within certain official and military circles.[2] By the end of 1941, however, attitudes within Whitehall towards SOE were changing. Political pressure was now being asserted onto organisations which had initially been reluctant to support the organisation.[3] This change in emphasis was to have a lasting impact on the nature of SOE.

[1] These countries included Poland and Czechoslovakia. Aircraft at the start of the Second World War did not have the capacity to reach these countries and return to their home airfields.
[2] TNA CAB 301/51 Report on SOE p. 3
[3] TNA AIR 20/2901 Freeman to Harris 23/03/1942

Before late 1941, SOE was still learning the operational procedures necessary to conduct clandestine warfare successfully. Once they had gained this knowledge, the organisation still lacked sufficient infrastructural capacity to utilise the European Resistance at its full potential. What was required was a political catalyst which would trigger the expansion of SOE. This eventually came in the form of Soviet Russia.

On 22 June 1941, the German military launched Operation BARBAROSSA and the invasion of Russia commenced. Once the *Politburo* accepted that this was actually an incursion on their territory, Stalin began demanding that Britain open a second front. If Churchill could not provide this, Stalin expected the immediate dispatched of aid. For 13 weeks following the invasion, Britain could only provide the Soviets with moral support.[4] At the time, Churchill lacked the spare operational capacity necessary to open a second front.[5] British help was also not forthcoming as the Chiefs of Staff Subcommittee of the War Cabinet were unwilling to change strategy. There also a general feeling that the Soviets would soon capitulate. By 4 September 1941, Stalin's patience was at breaking point. His representatives, therefore, began indicating that they would be willing to consider a separate peace treaty with Hitler. Within a month, the first convoy of fighter aircraft was on its way to Russia.[6]

By despatching aid, Britain hoped to pacify their restless ally. As a substitute for a second front, Churchill invested in proxy operations. Although the Battle of the Atlantic and the North African campaign were impacting the German military, they had little influence on its march to Moscow.[7] Churchill's greatest symbolic act towards the Soviets was the RAF's strategic bombing campaign.[8] The Joint Planning Staff were also of the opinion that commando raids on the French and Norwegian coast would have an effect on German troop deployment to the Eastern Front.[9]

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[4] Abraham Roof, 'A Separate Peace? The Soviet Union and the Making of British Strategy in the Wake of 'Barbarossa', June – September 1941', *Journal of Slavic Military Studies*, 22.2 (2009) pp. 239, 249

[5] Roger Beaumont, 'The Bomber Offensive as a Second Front', *Journal of Contemporary History*, 22.1 (1987) p. 4

[6] Abraham Roof, 'A Separate Peace …' pp. 241, 250

[7] Roger Beaumont, 'The Bomber Offensive …' p. 4

[8] The contribution and timing of the bombing offensive in relation to Anglo-Soviet relations is well known. See Richard Overly, *Why the Allies Won* (London, 2006), Jonathan Fenby, *Alliance: The Inside Story of how Roosevelt, Stalin and Churchill Won one War and Began Another* (London, 2008) and Roger Beaumont, 'The Bomber Offensive …'.

[9] Abraham Roof, 'A Separate Peace …' p. 247

What has, however, not previously been considered was the nature of the resistance within Europe in Anglo-Soviet relations. Despite the heavy investment of resources Britain allocated to the bombing offensive, Stalin still insisted Britain land troops in mainland Europe.[10] By the commencement of Operation BARBAROSSA, SOE had begun demonstrating the strategic value of small groups of highly trained and determined agents. Following the success of Operation JOSEPHINE B,[11] Dalton informed Churchill that his organisation had proved that 'industrial targets, especially if cover [*sic*] only a very small area, are more effectively attacked by SOE methods than by air bombardment'.[12] Contemporary post-strike photographic analysis estimated that only 25% of the RAF's payload landed within five miles of the designated target.[13] In comparison, SOE could achieve better results with only three men, one aircraft and some explosive charges.

For a country suffering from equipment shortages, SOE offered the British Government a cost effective method of engaging German troops in mainland Europe. Insurgencies have the capabilities of tying down large numbers of enemy combatants.[14] Although the occupying German forces could impose draconian counterinsurgency tactics which require fewer troops, an increase in activities by the resistance would, inevitably, lead to a greater military presence in the region. This would, therefore, have an impact on the number of troops deployed to the frontline.

Insurgents also have a negative impact on the combat effectiveness of enemy troops. In war zones, soldiers not only face the imminent danger of loss of life or limb, but also witnessing the death and mutilation of their comrades.[15] In these situations, there is a tendency of greater fear towards mines and booby-traps which strike without warning and are often designed to maim. The threat of Improvised Explosive Devices (IEDs), therefore, leads to higher levels of anxiety amongst soldiers even when in the rear echelons.[16]

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[10] Jonathan Fenby, *Alliance* p. 66
[11] On the night of 7 June 1941, a group of SOE trained agents managed to destroy eight transformers at the Pessac Transformer Station, France (William Mackenzie, *The Secret History of SOE: Special Operations Executive 1940-1945* (London, 2002) p. 246).
[12] William Mackenzie, *The Secret History of SOE* p. 246
[13] Roger Beaumont, 'The Bomber Offensive …' p. 7
[14] See E Smith, *Counter-Insurgency Operations 1: Malaya and Borneo* (Shepperton, 1985)
[15] Charles Moskos, *The American Enlisted Man: The Rank and File in Today's Military* (New York, 1970) p. 141
[16] Richard Holmes, *Acts of War: The Behaviour of Men in Battle* (London, 2004) pp. 209, 211

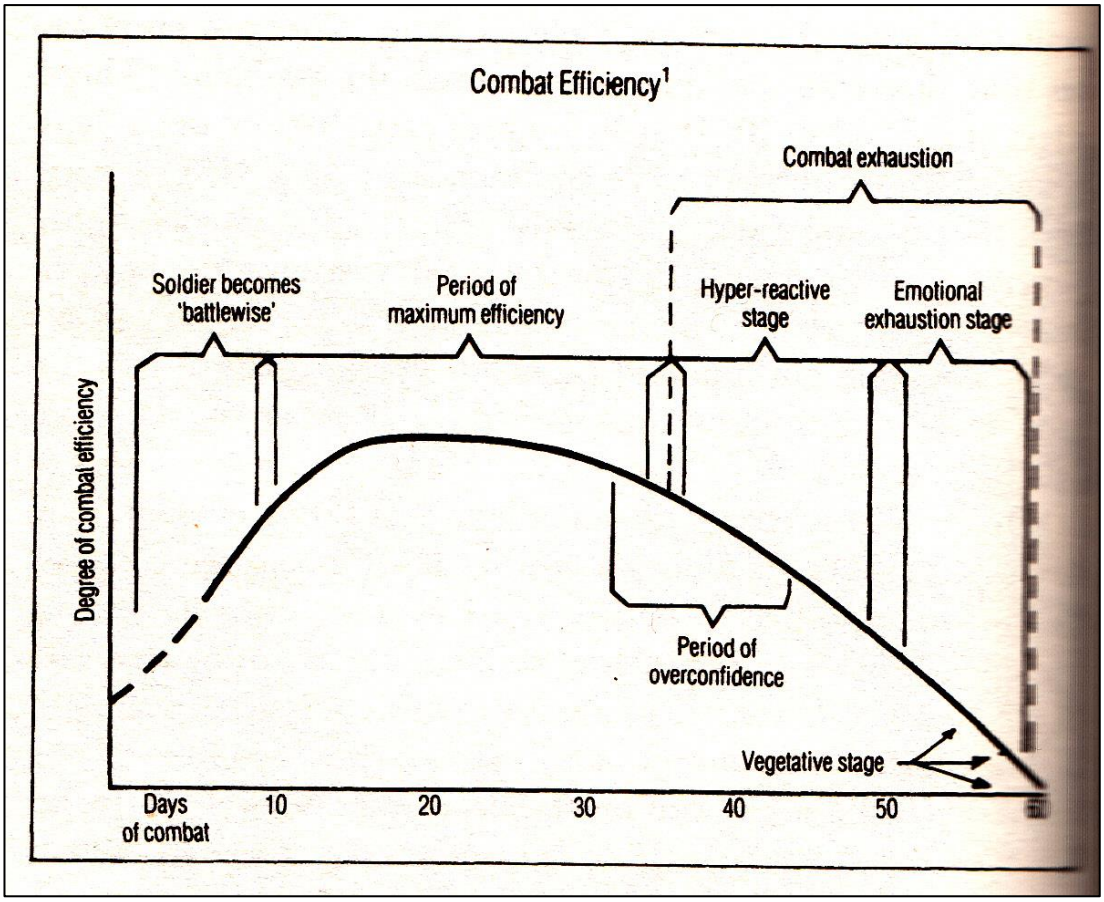

Figure 124: The effect of fighting on Combat Efficiency.[17] *By increasing levels of anxiety and fear amongst German soldiers, SOE could increase combat exhaustion which reduced their efficiency.*

The development of camouflaged IEDs by SOE was intended to undermine the morale of German soldiers.[18] Although designed to maim, the comparatively small number of devices manufactured meant they would only invalid limited numbers of enemy troops. The knowledge of their existence would, however, heighten levels of stress and anxiety amongst the German forces. Constant fear of booby-traps restricted soldiers' ability to relax. This can lead to Post Traumatic Stress Disorder (PTSD) and an inevitable decrease in combat efficiency (*Figure*

[17] Richard Holmes, *Acts of War: The Behaviour of Men in Battle* (London, 2004) p. 214
[18] These IEDs included explosive coal, anti-personnel torches and incendiary soap. See Roderick Bailey, *Secret Agent's Handbook: The Top Secret Manual of Wartime Weapons, Gadgets, Disguises and Devices* (London, 2008) for a catalogue of items developed by SOE. IEDs developed by SOE also affected the work of people employed by the German military. Stokers working on the railway were unlikely to work efficiently if they were constantly aware of the dangers of explosive coal. The fear of IEDs is just as effective as the equipment.

124).[19] SOE, therefore, had the ability to tie down troops away from the frontline whilst also decreasing their fighting capability.

By 1942, SOE had demonstrated the effectiveness of small numbers of highly trained agents in achieving strategic objectives. With increasing Soviet demands for a second front, the organisation offered Whitehall a cost-efficient method of engaging enemy troops in mainland Europe. The nature of SOE's operations and its support of civil disobedience were also in keeping with Soviet revolutionary ideology. Germany's invasion of Russia was effectively the trigger which led to the growth of the organisation. This expansion, combined with the lessons learnt, allowed SOE to grow into a highly capable and competent organisation.

SOE: an Amateurish Organisation?

One of the most persistent criticisms of SOE was that the organisation was 'amateurish'. These accusations tend to focus on SOE's early history. Churchill was of the opinion, however, that it takes a minimum of five to 10 years to successfully establish a new Secret Service.[20] As demonstrated by this thesis, SOE achieved this in less than two years. It was also:

> 'never true that those responsible for S.O.E. were complete amateurs in secret service work.[21] C.D. himself worked for the S.I.S. in Switzerland from the beginning of the war until July 1940. Colonel Taylor worked in the original Section IX of the S.I.S. from May 1939 until S.O.E. was formed. Brigadier Gubbins had had long periods of service both in Military Intelligence and in the special "sabotage" section known as "M.I.R.", and Colonel Davies too, had served in M.I.R'.[22]

One of the greatest advocates for undermining SOE was SIS. Throughout the latter's early life, it had itself been regularly attacked by departmental rivals. In the

[19] Theodore Nadelson, *Trained to Kill: Soldiers at War* (Baltimore, 2005) p. 91
[20] Keith Jeffery, *MI6: The History of the Secret Intelligence Service 1909-1949* (London, 2010) p. 157
[21] On the formation of SOE in July 1940, the nucleus of the new organisation was formed by SIS personnel. Initial accusations of amateurism by SIS were, therefore, counterintuitive as this criticism would reflect badly on them.
[22] TNA FO 1093/155 Minute 27/03/1942 p. 4

wake of the Venlo disaster, the reputation of SIS was further tarnished.[23] By removing Section D from SIS, the organisation was once more being threatened. There was, within SOE, a concern that SIS felt that if they were 'not squashed quickly … we [SOE] will squash them'.[24] By focusing on SOE's supposedly 'amateurish' nature, SIS was attempting to undermine the former's legitimacy to operate independently. During wartime, an inefficient organisation could not be tolerated.

Throughout the Cold War, allegations of SOE's 'amateurism' were still advocated by those within SIS eager to continue the wartime bureaucratic rivalries. The image of SOE as an 'irresponsible, amateurish, and uncontrollable organisation', consorting with foreign radicals and revolutionaries, became firmly entrenched with post-war assessments.[25] By continuing to undermine their wartime 'rival', SIS was attempting to legitimise their role as the UK's premier intelligence agency.

In contrast to SIS's accusations of SOE's 'amateurism', this thesis has demonstrated that the organisation's UK based infrastructure was, when necessary, of a high standard, state-of-the-art and reflective. The greatest reflection of this was the wireless facilities the organisation constructed to communicate with their agents. These stations combined advanced technology with contemporary design standards in an attempt to offer a reliable and efficient service. The organisation also invested heavily in the development of innovative wireless sets. Combined, these provided SOE the ability to effectively coordinate the activities of the resistance across Europe.

The professionalism of SOE's infrastructure was also reflected in their STSs. Almost immediately following the organisation's formation, a training programme was devised. This system was so forward thinking and fit for purpose that only minor alterations occurred throughout the remainder of the war.[26] To ensure that the training was of a high standard, instructors embedded a heightened level of realism

[23] On 9 November 1939, Captain Best and Major Stevens, key figures in SIS's Dutch network, were captured by German Intelligence following fundamental failings in SIS's operational procedures. This 'amateurish' mistake compromised SIS's European network (Nigel Jones 'Introduction' in *The Venlo Incident: A True Story of Double-Dealing, Captivity, and a Murderous Nazi Plot*, Sigismund Best (London, 2009) p. xiv)

[24] TNA HS 8/321 M/XX/441 10/03/1942

[25] David Stafford, *Britain and European Resistance 1940-1945: A Survey of the Special Operations Executive with Documents* (London, 1980) p. 5

[26] The contemporary Special Air Service (SAS) still use a series of 'sieves' in their training syllabus to ensure only the best candidates graduate. Part of the SAS training programme also includes a 'killing house'. This is based on the 'fighting house' concept developed within SOE.

into their syllabuses. Central to their courses were models, military equipment, industrial machinery and innovative training facilities. Through the combination of state-of-the-art techniques and a focus on realism, SOE ensured that their students were as thoroughly prepared as practical.

Moreover, in addressing the charge of 'amateurism', it is significant that following the dissolution of SOE in 1946, the organisation's Research and Development Section and Training Section were incorporated into SIS. Acknowledged by contemporaries that in the 'training of underground workers … S.O.E. has done pioneer work of value',[27] SIS's decision to replace their own Training Section with that of SOEs reflects an organisation which coveted aspects of their rival. SIS's post-war actions suggest that the organisation's criticisms of SOE were not necessarily driven by operational concerns, but rather the result of inter-departmental bickering.

Early failures by the infant SOE were fundamental in tarnishing the organisation with a bad name.[28] Although quick to demonstrate their strategic capabilities, the continuation of criticism towards SOE was advantageous to rival organisations. The fact that clandestine warfare had never previously been undertaken in an official capacity meant allegations of SOE's 'amateurism' were an easy target.

Inter-Organisational Relations

Within post-war assessments of SOE, notions that jealous rivals plagued the activities of the organisation abound within the literature. These 'unfriendly feeling[s] in Departments with whom SOE has to work obviously leads to inefficiency'.[29] By focusing on episodes of interdepartmental strife, the complex and changing relations between SOE and other organisations is obscured. In July 1942, Sir John Hanbury-Williams and Edward Playfair reported to the Minister for Economic Warfare that 'SOE has, of course, day-to-day relations with many branches of all three Service Departments, and from all that we have heard they are

[27] TNA PRO HS 8/281 Suggested Note for Cabinet or Prime Minister p. 2
[28] TNA CAB 301/51 Report on SOE p. 3
[29] Ibid p. 3. Outside of the circle SOE operated in, the secretive nature of the organisation should have meant that it had no reputation at all.

satisfactory on both sides … We cannot [however] give nearly such a favourable account of SOE's relations with SIS'.[30]

Over SOE's lifetime, the worst relations the organisation had was with SIS who were 'more at arm's length than should ever be the case between two organisations which must be so closely connected'.[31] By 1942, this relationship was regarded as so bad that 'if things do not improve on the S.I.S. side, they are bound to get worse on the S.O.E. side:-

"Cet animal est tres mechant:
Quand on l'attaque il se defend."

These bad relations … lead to inefficiency, wasted effort, some duplication and it may be at times danger of life and liberty to devoted men, is not open to doubt'.[32] Through an assessment of SOE's UK based infrastructure, light can be shed on the nature of the organisation's inter-departmental relationships.

Throughout SOE's property portfolio, there was an observable geographical segregation between the organisation and SIS. Within London, the two sister organisations physically isolated themselves from one another by establishing office accommodation in different districts. Even on shared facilities, such as RAF Tempsford, SIS and SOE remained distant. This segregation, combined with the unequal relationship between the two organisations,[33] meant it was inevitable that mutual distrust would emerge. In August 1942, this reached a level whereby SOE began voicing concerns over the prospect of SIS tapping their phone lines. Although this could not be proved, it was still recommended that SOE install Typex machines.[34]

The nature of SOE's relations with the RAF and the Royal Navy were also reflected in the organisation's infrastructure. Initially, these two branches of the armed services resisted supporting clandestine warfare in situations where it directly impacted their operations. Despite political pressure forcing the RAF to increase the number of aircraft allocated to Special Duties, they remained fervently opposed to supporting the Secret Services. Eventually, the underequipped 138 and 161

[30] TNA CAB 301/51 Report on SOE p. 9, 11
[31] Ibid p. 4
[32] TNA CAB 301/51 Report to the Minister of Economic Warfare on the Organisation of SOE p. 11
[33] SOE was expected to provide SIS with intelligence, agents, training and operational support. The latter, however, even refused to provide SOE with access to GCCS decrypts.
[34] TNA HS 8/357 MS/KV/804 09/08/1942

Squadrons were allocated a substandard airfield. This allocation of resources limited the negative impact on the RAF's strategic bombing campaign.

Similarly, the Royal Navy occasionally saw SOE's activities as detrimental to their organisation. The operation of a 'private navy' within the English Channel by SOE could lead to more aggressive patrolling by the *Kriegsmarine*. This could have serious implications for the security of British warships. In 1942, therefore, the command of the Helford Flotilla was transferred from SOE to NID(c). SOE's relations with the Royal Navy, however, were not always hostile. Due to the size of the North Sea, the activities of the Shetland Bus were of little concern to the Admiralty. Within this sphere, both organisations could operate without impacting the others effectiveness. The Royal Navy were, therefore, happy to provide SOE with material support to enable them to expand their activities.

In an effort to maintain courteous relations with the armed services, SOE often collaborated with sister organisations. On a regular basis, the organisation supported activities of the Combined Operations Headquarters. Most famously, SOE designed the charges used during Operation CLAYMORE.[35] In an effort to achieve the strategic objective of destroying the battleship TIRPITZ, SOE invested heavily in designing miniature submarines. This inevitable resulted in a working relationship developing with the Royal Navy.

As SOE operated globally, it was also essential that the organisation developed strong links with foreign bodies. One of the closest collaborations formed by SOE was with the OSS. Only established in June 1942, SOE was fundamental in coaching their American counterparts in the techniques of clandestine warfare. By chaperoning the OSS, SOE ensured the infant organisation could not undermine the reputation of the Allies amongst the resistance within occupied Europe. This mentoring was reflected in the nature of numerous sites throughout the UK operated by the OSS. At both Area H and Station 53c, SOE ensured they maintained a presence to oversee the quality of the Americans' work.

Over the duration of the Second World War, SOE's relations with other organisations rarely remained static. Initially, there was a general unwillingness to collaborate with the organisation which was based on their early failures. This

[35] Operation CLAYMORE was a Combined Operations Raid on the Lofton Islands, Norway. During this raid fish oil facoties and 3,600 tonnes of oil and glycerine were destroyed. Des Turner, *Aston House Station 12: SOE's Secret Centre* (Stroud, 2006) p. 55

reluctance continued in areas of operation where the activities of the organisation might impact the operations of the other armed services. As SOE gained experience and political backing, support from other organisations was more forthcoming.

'Stately 'Omes of England'[36]

Further criticisms of the organisation have also 'generally centre[d] on S.O.E.'s alleged wastefulness and extravagance'.[37] In a further effort to undermine SOE, Lieutenant Colonel Claude Dansey from SIS rechristened the organisation with the derogatory title of the 'Stately 'Omes of England'. This attack on SOE's property portfolio was to invoke notions of irresponsible empire building. By criticising their estate, Dansey was drawing attention away from the tangible results of their successful operations. This thesis has, however, demonstrated that although the organisation's property portfolio was extensive, it was necessary.[38] It was the size of their estate which made SOE unique amongst the British Secret Services. Due to the nature of their work, facilities were required to train large numbers of agents, supply them with purposely designed equipment and to communicate with operatives abroad.

It was the preference of the Minister for Economic Warfare, Dalton, that SOE should only use 'houses [that had] already [been] requisitioned'.[39] In order to obtain properties, the organisation had to approach the War Office's Land Branch. If they had nothing suitable, SOE then contacted the Ministry of Works.[40] Occasionally, if circumstances necessitated it, accommodation would be found in local advertisements.[41] In January 1941, SOE established a Properties Section who were 'responsible for vetting all demands for premises and land required by S.O.E. in the U.K., for checking that such demands had been given the necessary internal approval

[36] Although Dansey used the term 'Stately Homes', the majority of the properties acquired by SOE were just large houses.
[37] TNA CAB 301/51 Report on SOE p. 4
[38] SOE was not the only organisation which required large numbers of properties to operate effectively. To ensure the infrastructure did not grow beyond necessary requirements, SOE put in place various safeguards. See p. 239.
[39] TNA HS 8/337 Letter to Jebb from Hicks 08/09/1941
[40] TNA HS 8/337 Draft of Suggested Reply to Mr George Hicks' Letter to the Minister dated 28th August, 1941 p. 1
[41] TNA HS 8/337 Letter to Gaitskell from Venner 03/09/1941

(including financial sanction) or for obtaining such approval, for acquiring, preparing, furnishing and maintaining all such approved requirements, and finally for their disposal when no longer required'.[42] This section ensured that all requests for property had been fully justified.

The bureaucratic hurdles SOE had to navigate to procure new properties ensured they had valid reasons for the acquisition. During the requisitioning of Gaynes Hall in 1942, the disgruntled owner was informed that Queen Elizabeth had been 'satisfied that the desire of the Government Department concerned is neither thoughtless nor frivolous, but is founded upon considerations which have a serious national justification'.[43]

Although the establishment of a property portfolio was essential to the function of SOE's role, the organisation demonstrated a preference to reallocating functions to pre-existing facilities. On gaining operational control of their wireless networks in 1942, SOE located their first Home Station at Grendon Underwood. This facility had, however, been used as a 'training centre for some time'.[44] By adapting and changing the function of properties within their estate, SOE could limit the size of their portfolio to the bare essential.

SOE's acceptance to restrict the size of their estate was part of internal policy. The organisation ensured that their staff were aware that the 'reduction of building work to a minimum is a matter of greatest National importance, Commandants [of Country Establishments] will therefore ensure that requests for maintenance and alterations to premises are made only when absolutely essential'.[45] Analysis of aerial photographs indicates that this policy was adhered to by the commandants.

This thesis has for the first time shown the extent of SOE's property portfolio in the UK during the Second World War. Past accusations of empire building and extravagance, typified by Dansey's derogatory 'Stately 'Omes of England', have been demonstrated as falsehoods. Instead, SOE's property portfolio should be regarded as representative of the capacity of the organisation to undertake global operations.

[42] TNA HS 7/15 Properties Section History 06/03/1946 p. 1
[43] TNA HS 8/337 Buckingham Palace 13/10/1941
[44] TNA HS 8/321 CD/OR/1565 17/04/1942 p. 1
[45] TNA HS 7/15 Property Arrangements at Country Establishments p. 1

The Destructive Nature of the Military

In post-war assessments of military requisitioning, accusations of troops blatantly disregarding private property abound within the literature.[46] These generalisations, however, tarnish all organisations operating from Country Houses during the Second World War. Those buildings in the care of SOE were actually treated with care and consideration.

Over the course of the war, the War Office 'unfortunately got a bad name in some districts owing to the damage done to houses by Military Units. It has been found that the fact that the Ministry of Works are themselves the custodians of Ancient Monuments and that I.S.R.B. [SOE] have been able to convince owners that they really do treat houses better than ordinary Military Units do'.[47] One benefit of maintaining this positive image was that opposition to the organisation requisitioning a property was reduced.

To ensure that their impact on buildings was kept to a minimum, SOE's 'Properties Section Officers inspected premises periodically. The aim was to inspect each premise every 6 months but pressure of more urgent work prevented this target being achieved until the summer of 1944 when a Properties Section Officer was engaged solely on inspections'.[48] In order to protect personal belongings, SOE requested that all furniture was removed from the premises before they were taken over. Although every effort was made 'to do this at the time of requisitioning … the acute shortage of storage accommodation made it impossible in some cases. Any such items left on the premises must be most thoroughly sealed off and regularly inspected by the C.O. of the sealed off entrances is necessary in order to ensure that any interfrance [*sic*] is promptly discovered and that immediate remedial action is taken'.[49] Wood panelling was also erected within properties to cover the original structure.[50] This limited the organisation's impact on the buildings they occupied.

SOE's respect for the properties they requisitioned is illustrated by the survivability of these buildings. The vast majority of the pre-war structures occupied

[46] Matthew Kempson, *The State and the Country House in Nottinghamshire, 1937-1967* (Unpublished PhD Thesis, University of Nottingham, 2006) p. 30
[47] TNA HS 8/337 Draft of Suggested Reply to Mr George Hicks' Letter to the Minister dated 28th August, 1941 p. 1
[48] TNA HS 7/15 Properties Section History p. 7
[49] Ibid p. 7
[50] Ibid p. 7

by the organisation remain habitable. As this thesis has demonstrated, SOE restricted building work to only that which was required. Those facilities which were expanded under the organisation's tutelage no longer survive. This is mainly because of post-war change of function. At Aston House, the extensive storage facilities have been replaced by a golf course. Whilst the packing station at Gaynes Hall and the Home Station at Grendon Underwood are both now prisons. Those sites operated by SOE which have survived are all related to the organisation's wireless communications. As this thesis has shown, these facilities were state-of-the-art. In an intelligence driven, pseudo-war, radio networks are a vital lynchpin. The survival of SOE's Home Stations may partially be attributed to the post-war environment. By maintaining these structures, they could be re-commissioned if required.[51]

Throughout the Second World War, SOE went out of their way to protect the property they requisitioned. This ensured their good name whilst also limiting potential compensation claims following the end of hostilities.[52] The popular generalisation that the military paid little heed to private property is contradicted by the activities of SOE.

The Built Infrastructure of the Secret Services: A Theoretical Discussion

Prior to this thesis, no comprehensive scholarly assessment had been made of the property portfolio of a branch of the British Secret Services. By combining historical and archaeological methodologies, this research has demonstrated the value of interdisciplinary approaches to the study of clandestine organisations. This approach has the potential to shed new light on clandestine organisations which operate both within and outside internal law. The centrality of SOE's infrastructure to this thesis has enabled the discrepancies, gaps and biases found in the documentary record to be addressed.

To function effectively, clandestine organisations must remain hidden from the public and officialdom. It is, therefore, essential that an opaque façade is erected

[51] Station 53c's transmitter at Poundon survived the Cold War as it was turned into a SIS communications facility.
[52] TNA HS 7/15 Property Arrangements at Country Establishments p. 1

separating ‘us’ from ‘them’. This inevitably leads to negative connotations and public hysteria over ‘shadowy’ figures operating outside the law.[53] By incorporating a non-biased, tangible source into the study of clandestine organisations, light can be shed into the murky world of intelligence gathering. Although there are certain limitations associated with this infrastructure,[54] it can provide the public an insight into the nature of the operations conducted by the Secret Services.

To maintain the security of these organisations, both physical and metaphysical barriers have to be erected. The nature of these obstacles often reflects public attitudes, external threats and the contemporary geopolitical situation. During the Second World War, the nature of security imposed by branches of the Secret Service was fundamentally different, for example, to that of the Cold War. As this was a ‘total war’, extensive militarisation of the landscape became a common sight. The general population became accustomed to the presence of troop movement and the requisitioning of property for the armed services. By merging into the background and not drawing attention to themselves through extensive physical security measures, SOE could operate relatively unimpeded.

Through a combination of physical isolation,[55] hidden non-lethal booby-traps[56] and a lack of excessive security precautions, SOE managed to maintain a low profile. The lack of physical barriers came to a fore when local youths occasionally succeeded in gaining access to their properties.[57] Fences were only installed at facilities which were established to store valuable equipment. This indicates that these security precautions were generally intended to deter opportunist thieves rather than enemy agents.

The security of the Secret Services has, however, undergone a sea-change since the end of the Second World War. Following the defeat of Nazi fascism, the Cold War was characterised by covert, intelligence driven ‘pseudo’ warfare. Rapid developments in technology meant the safeguarding of a nation’s technological

[53] Throughout 2014, the media was constantly reporting whistle-blowers from within the intelligence community who claimed they had been involved in illegal activities such as extraordinary rendition.
[54] As these organisations are often at the forefront of technological advancements, all internal fixtures and fittings are removed at the time a building is vacated.
[55] Physical isolation was initially used to hide the activities of the Shetland Bus from the local population. This, however, rapidly proved to impact operational effectiveness.
[56] At Station 17, Brickendonbury, non-lethal booby-traps were erected along the driveway in an effort to deter curious trespassers.
[57] A group of teenagers managed to break into STS63 and steal a quantity of explosive charges without being caught. There are also reports of local youths gaining access to RAF Tempsford and entered a number of aircraft before being apprehended.

secrets was a vital element in maintaining the *status quo*. In order to identify tactical advantages, the adversaries had to rely on their intelligence agencies.

As the geopolitical situation and public perceptions became more hostile and contested, it was essential that security precautions became more overt. Wire fences, 'sterile zones', crash barriers and watchtowers were required to physically separate sensitive spaces from prying eyes.[58] Once civil liberties are deemed to be eroded by increasing the powers of these organisations, security precautions can never regress back to those employed by SOE.

The combinations of facilities operated by the Secret Services are unique to the organisation. Those branches involved in signals intelligence require intercept facilities and decoding establishments, whilst those branches which rely on human sources need reliable communications. Certain aspects of the work of the Secret Services necessitated standardised facilities such as office accommodation and training bases. The combination of their infrastructure, however, is distinct to the organisation's role.

The highly specialised and unique nature of the various branches of the Secret Services means standardised infrastructure cannot be utilised. Equipment employed is often state-of-the-art and technologically advanced. This generally requires facilities to be designed for a specific purpose. It is, therefore, not feasible to develop a standardised categorisation of the infrastructure of the Secret Services. Each branch, therefore, has to be studied individually. The infrastructure of SOE, as identified by this thesis, cannot be used to assess any other of Britain's wartime Secret Services. GCCS, SIS, MI5 and the Auxiliary Units each require their own study.

SOE's International Legacy

At the outbreak of the Second World War, officially sanctioned clandestine warfare had never occurred on the scale which was to be conducted by SOE. This organisation rapidly developed, adapted and perfected procedures essential for

[58] See Wayne Cocroft and Derwin Gregory, *Barnham, St Edmundsbury, Suffolk: RAF Barnham, Special Storage Site. Documentary Analysis of Sources in The National Archives* (Swindon, 2011)

subversive activities. Over the six years of SOE's existence, its operational record inevitably means its legacy can still be felt worldwide. Although the focus of this thesis was SOE's UK based infrastructure, the organisation's international footprint cannot be ignored.

Figure 125: Camp X, Canada. In order to train students, communication facilities, a parachute 'Jump Tower', repair shops, a lecture hall, accommodation blocks, mess hall, firing range and assault courses were all constructed.[59]

In order to operate globally, SOE established regional headquarters throughout the world. These included facilities in Cairo,[60] Gibraltar[61] and Singapore.[62] On 7 September 1941, SOE established the first complex in North

[59] Private Collection 1943
[60] Michael Foot, *SOE: The Special Operations Executive 1940-46* (London, 1993) p. 55
[61] TNA HS 8/19 From M To CD 28/01/1943
[62] Christopher Bayly and Tim Harper, *Forgotten Armies: Britain's Asian Empire and the War with Japan* (London, 2005) p. 133

America for training agents in subversive warfare (*Figure 125*).[63] This was followed in November of the subsequent year by the establishment of a 'forward base for the continuation and extension of S.O.E work into Europe' at the Club des Pins, Algeria.[64] By establishing facilities across the globe, SOE enabled the organisation's agents to acclimatise to their area of operation. This also promoted localised decision making which could potentially decrease SOE's reaction time to changing conditions.

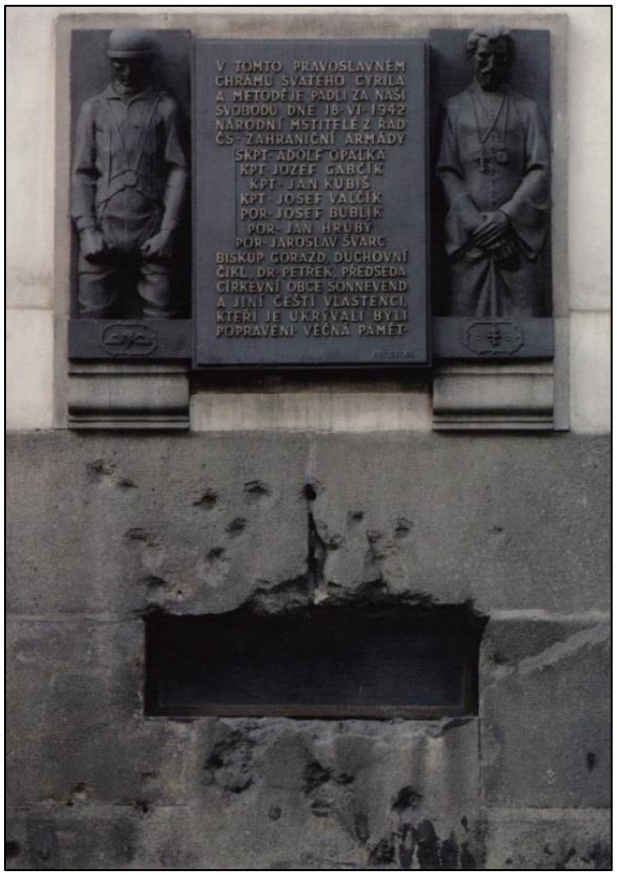

*Figure 126: The bullet scars on the Church of St Cyril and Methodius, Prague, the physical legacy of Operation ANTHROPOID. Following the assassination of SS-*Obergruppenführer *Reinhard Heydrich, SOE's agents took refuge in the crypt of this church before committing suicide.*[65]

[63] Agents from the FBI, OSS, SOE, SIS, BSC and RCMP would all receive instruction in clandestine warfare from this facility (David Stafford, *Camp X* (New York, 1988) pp. xvi, xvii, 21).
[64] TNA HS 8/19 Massingham Operational Instruction No. 1 14/12/1942 p. 1 and Michael Foot, *SOE* p. 55. Club des Pins was a resort of villas set admits the sand dunes on a beach in an area known as Guyotville, Algeria (Marcus Binney, *The Women who lived for Danger: The Women Agents of SOE in the Second World War* (London, 2002) p. 79).
[65] Stanislav Krupař, Nigel West, *Secret War: The Story of SOE Britain's Wartime Sabotage Organisation* (London, 1992) p. 89, Russell Miller, *Behind the Lines: the Oral History of Special*

The global legacy of SOE is not, however, restricted to the organisation's facilities. Sites associated with personal sacrifices made by members of the resistance have inevitably become focuses of commemoration.[66] These sites can, therefore, act as centres of reconciliation, education and remembrance (*Figure 126*).

SOE has also left an impact on the nature of conflict. With the rise of technologically advanced 'superpowers' in the wake of the Second World War, SOE demonstrated to terrorists, radicals and insurgents the strategic value of clandestine warfare.[67] Mexican drug cartels regularly use miniature submarines to transport their products, the Irish Republican Army (IRA) assassinated political leaders, the Stasi used plastic surgery to alter the appearance of their agents and the Central Intelligence Agency (CIA) planned to send Fidel Castro an exploding cigar. These techniques all have their origins within SOE. Although only in existence for six years, SOE's global legacy can still be felt today. The operations conducted by the organisation demonstrated the strategic value of small groups of highly trained, dedicated and well equipped agents.

Survival of Sites

This thesis has identified 176 properties associated with SOE's activities within the UK during the Second World War. Of these, 67 were associated with training, seven with research and development, 22 with supply, 11 with transportation, seven with communication and 62 with command and control. The author has located 98% of these to an accuracy of a six-figure grid reference: only 3 sites could not be located. Due to the state of SOE's archive (see pp. 5-8), it is probable that some sites might have been overlooked. This thesis has, however, increased our knowledge of SOE's property portfolio by approximately 32%.[68]

Operations in World War II (London, 2002) p. 49 and Roderick Bailey, *Forgotten Voices of the Secret War: An Inside History of Special Operations during the Second World War* (London, 2008) p. 116

[66] John Schofield, *Combat Archaeology: Material Culture and Modern Conflict* (London, 2005) p. 61

[67] As other organisations have also demonstrated the value of clandestine warfare, SOE was not the sole inspiration.

[68] This figure has been calculated by cross checking the gazetteer with the secondary published literature.

Surviving Sites: HER and English Heritage's Pastscape Evidence

In order to identify SOE's properties which had already been documented, the author consulted the HER and Pastscape records available on the Heritage Gateway website. Due to practical reasons, only sites located outside of London were checked (*Table 18*).[69]

	Pastscape		HER	
	Number	**%**	**Number**	**%**
Reference SOE	3	2	6	3
No Reference to SOE	77	44	54	31
Outside of the Geographical Scope for the Data	24	13	44	25
Sites Outside of London	69	39	69	39
Unknown Location	3	2	3	2

Table 18: Pastscape and HER data, which is freely available online at 'Heritage Gateway', were checked for reference to SOE. The results clearly indicate that prior to this study, there was little information relating to the organisation's facilities available within the heritage community.

Due to a combination of factors, only 46% and 34% of SOE's facilities were covered by Pastscape and HER data. Of the 80 sites Pastscape had data for, only 3 referenced SOE's activities. In comparison, of the 60 properties recorded in the HERs, 6 referred to the organisation. These figures clearly highlight low level recording of sites associated with the Secret Services in both local and national archaeological databases.

Future Work

Following the documentary survey of SOE's property portfolio presented in this thesis, a programme of archaeological field assessment should be initiated. Due

[69] See Appendix D: Miscellaneous Data for a list of the sites which were recorded by the HERs and Pastscape on Heritage Gateway by July 2015.

to the ephemeral nature of the organisation's facilities and their willingness to utilise pre-existing structures, excavations will be able to provide tangible evidence for the nature of SOE's infrastructure. It has been estimated that there is the possibility of surviving physical traces at approximately 86% of the organisation's non-London based properties (see Appendix D: Miscellaneous Data). The combination of documentary sources with field data will bring greater rewards to the study of SOE than either in isolation.

Cultural Significance

In studying built heritage, it is important to consider the cultural significance of the structures. Places maybe valued for various reasons beyond utility or personal association. Value can be attached to a site's 'distinct architecture or landscape, the story it can tell about its past, its connection with notable people or events, its landform, flora and fauna, because they find it beautiful or inspiring, or for its role as a focus of a community'.[70] In 2008, English Heritage, now Historic England, defined significance as the 'sum of the cultural and natural heritage values of a place'.[71] Cultural values were arranged into four groups:

> 'Evidential value: the potential of a place to field evidence about past human activity.
> Historical value: the ways in which past people, events and aspects of life can be connected through a place to the present – it tends to be illustrative or associative.
> Aesthetic value: the ways in which people draw sensory and intellectual stimulation from a place.
> Communal value: the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory.'[72]

[70] English Heritage, *Conservation Principles; Polices and Guidance for the Sustainable Management of the Historic Environment* (Swindon, 2008) p. 27
[71] Ibid p. 72
[72] Ibid p. 7

By understanding and articulating the values and significance of a place, informed decisions can be made about the future of a site: '[t]he degree of significance determines what, if any, protection, including statutory designation, is appropriate under law and policy'.[73] What follows, therefore, is an assessment of the 'cultural values' of SOE's property portfolio based on English Heritage's criteria.

Evidential Value

As 'evidential value' is the potential of a place to yield evidence about the past, English Heritage place a strong emphasis on 'age', although this is not paramount. Evidential value is particularly important in the absence of written records. The material record, in particular archaeological deposits, therefore, provides a vital source of information.[74] As approximately 87% of SOE's archive has been destroyed (see p. 9), the organisation's property portfolio can be regarded as having evidential value.

Historical Value

Historical value, which is derived from ways in which the past can be connected to the present through a place, can be regarded as either illustrative or associative. Illustrative relates to perceived links between a place's past and the present. The value tends to be greater if the site incorporates the first or only surviving example of consequential innovation.[75] As SOE tended to utilise pre-existing structures instead of constructing new facilities, the organisation's property portfolio is rarely illustrative of their activities.

Places can also have historical value if they have an association with a notable family, person, event or movement.[76] Being the location of something momentous can 'increase and intensify understanding through linking historical

[73] English Heritage, *Conservation Principles* p. 21
[74] Ibid p. 28
[75] Ibid pp. 28-9
[76] Ibid p. 29

accounts of events with the place where they happened – provided, of course, that the place still retains some semblance of its appearance at the time'.[77]

Throughout the Second World War, SOE was not only vital in undermining the Axis war effort, but also in maintaining the moral of citizens under occupation. The organisation's facilities in the UK are, therefore, of significant associative historical value.

Aesthetic Value

The aesthetic value of a place is associated with either conscious design or a sites fortuitously evolution over time. It is, however, more common for a place to combine aspects of the two.[78] Although aesthetic value 'tend to be specific to a time and cultural context … appreciation of them is not culturally exclusive'.[79] The design value of a place incorporates composition, construction material, planting, decoration, detailing and craftsmanship. Values attached to these can also change over time as a response to particular cultural frameworks.[80] Based on English Heritage's definition of aesthetic value, those facilities purposely built by SOE are unlikely to be regarded as visually appealing: they were designed to be functional rather than attractive.

Communal Value

Communal value, which can be derived from people associated with a place, can be either commemorative or social. Commemorative value 'reflect the meanings of a place for those who draw part of their identify from it, or have emotional links to it. The most obvious examples are war and other memorials raised by community effort, which consciously evoke past lives and events'.[81] SOE's properties can be regarded as important components of our collective memory. These sites were vital to supporting the resistance and are also significant places of remembrance.

[77] English Heritage, *Conservation Principles* p. 29
[78] Ibid p. 30
[79] Ibid p. 30
[80] Ibid p. 30, 31
[81] Ibid p. 31

The Cultural Significance of SOE's Property Portfolio

In order to assess the significance of a place, English Heritage compiled a list of factors which should be considered. These include the following:[82]

> 'Understanding the fabric and evolution of the place.
>
> Identify who values the place, and why they do so.
>
> Relate identified heritage values to the fabric of the place.
>
> Consider the relative importance of those identified values.
>
> Consider the contribution of associated objects and collections.
>
> Consider the contribution made by setting and context.
>
> Compare the place with other places sharing similar values'.[83]

When assessing SOE's property portfolio using this cultural significance checklist, issues are raised over these criteria when applied to modern military heritage. This thesis has provided the necessary understanding of the fabric and evolution of SOE's property portfolio. By itself, however, this does not provide 'sufficient understanding of place. The information gained will need to be set in the context of knowledge of the social and cultural circumstances that produced the place'.[84]

According to English Heritage, in order to provide a sound basis for management, it is essential that individuals and communities 'who are likely to attach heritage values to a place should be identified, and the range of those values understood and articulated, not just those that may be the focus of convention'.[85] Identifying individuals associated with the Secret Services is, however, problematic. On joining these organisations, staff were sworn to secrecy and required to sign the Official Secrets Act. Those individuals who have been employed by the Secret Services, therefore, rarely talk of their experiences.

The nature of the work undertaken by SOE meant that the majority of their staff were field agents. Only a select number, therefore, spent extended periods of time at SOE's UK facilities. Those destined to operate as agents only had a fleeting experience of the organisation's support infrastructure. They were also unlikely to know the precise location of where they were accommodated. These agents are,

[82] Not every factor, however, is applicable.
[83] English Heritage, *Conservation Principles* p. 8
[84] Ibid p. 35
[85] Ibid p. 36

therefore, likely to attach significance collectively to SOE's property portfolio instead of individual sites. Only those who spent extended periods at times at specific sites, such as at the research and development and wireless hubs, will value individual properties.

Cultural significance is also related to the heritage value of the fabric of a place. This depends on the survival of traces of the past and is only diminished if obliterated or concealed.[86] English Heritage, therefore, inexplicably link a places historical value to surviving fabric. As illustrated by this thesis, SOE preferred utilising pre-existing structures over erecting purpose built facilities. Historical association between a property and its past is often, however, not visible within the structure's fabric. It is, therefore, essential that the heritage value of a place should take into account the intangible.

When assessing the significance of a place, it is desirable to identify all its heritage values.[87] As SOE occupied pre-existing structures, the organisation's property portfolio is more likely to be classified as 'significant' due to tangible aspects of the places history. Although Audley End, Essex, for example, was an important centre for training Polish agents, it is more highly valued for being one of the largest and most opulent houses from Jacobean England. Whilst Gaynes Hall, SOE's packing station, is Grade II* listed because it is an eighteen century country house by the architect George Byfield.[88]

As SOE had limited physical impact on the landscape, the organisation's properties cannot be classified as 'significant' based on English Heritage's 2008 criteria. Using these guidelines, only SOE's communication facilities warrant official protection. This thesis has demonstrated that although a place might not contain tangible traces of the past, this does not impact its significance. When assessing value, consideration should be taken of intangible historical association.

[86] English Heritage, *Conservation Principles* p. 29
[87] Ibid p. 38
[88] The National Heritage List for England No. 1288478

Concluding Remarks

Prior to this research, the academic study of SOE has inevitably focused on the 'glamorous' exploits conducted by the organisation's Country Sections. These studies, therefore, have to rely on a fragmented and chaotic archive.[89] In order to negate the inherent challenges posed by the documentary records of the Secret Services, this thesis has focused on SOE's UK based infrastructure. Although the methodology employed has been tried and tested in previous studies, this is the first time it has ever been applied to an entire branch of the British Secret Services. By incorporating SOE's infrastructure, which is free from documentary bias, this research has provided a more holistic and subjective assessment of the organisation.

Through focusing on SOE's property portfolio, this study has demonstrated that at the outbreak of the Second World War there were few facilities within the UK dedicated to clandestine warfare. The organisation, therefore, had to rapidly expand whilst attempting to initiate global resistance in parallel to developing operational procedure. It was inevitable that these early 'amateurish' attempts would be plagued by failure. This was, however, to have a lasting impact on how SOE's sister organisations viewed clandestine warfare. In 1942, as a result of the German invasion of Russia, there was a greater incentive to support indigenous resistance movements. Political support for SOE was, therefore, more forthcoming. This enabled the organisation to expand their property portfolio which predictably allowed them to increase their global activities. By the end of the war, SOE had put in place an extensive, yet necessary, infrastructure which incorporated innovation, reflectivity and pre-existing facilities.

This thesis has, for the first time, determined and mapped the full extent of SOE's property portfolio within the UK. Without an appreciation of the organisation's support infrastructure, an essential element in the evaluation of SOE's operations is missing. Future studies into this wartime branch of the British Secret Services now have a stronger foundation on which to build. By producing a gazetteer of SOE's properties, this thesis has undertaken the necessary primary research for further archaeological investigation.

[89] Due to the nature of the work undertaken by SIS, the organisation's archive will never be released into the public domain. Some correspondence does, however, appear in the files of organisations they had dealings with. As this thesis has, therefore, had to rely on SOE's archive it is, inevitably, SOE centric.

The demonstrable value this thesis has brought to the study of SOE can be replicated for certain other branches of the wartime British Secret Services. As this primary study relied on identifying sites from SOE's surviving archive, only those clandestine organisations which have deposited documents in the public domain can be subjected to a project of this nature. It will, therefore, never be possible to apply this methodological approach to SIS as it is their policy never to release files.

This thesis has demonstrated the value of material culture in assessing clandestine organisations. It has also produced the first comprehensive gazetteer of SOE's UK based infrastructure during the Second World War. This study, however, is only a starting point. Further research into SOE and its global infrastructure is required to fully comprehend the achievements of this remarkable organisation.

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FIR 2979 *Welrod bolt action pistol with replaceable box magazine*

HU 47884 – HU 47927 References correct at time of consulting.

HU 56737 *An aerial view of Gorhambury House in Buckinghamshire: home of an SOE wireless station transmitting 'black' propaganda to Germany*

HU 56740 *Welbike fitted with a generator for charging the batteries of a wireless set*

HU 56749 *The interior of No 7A wireless factory, Bontex Knitting Mill, Beresford Avenue, Wembley*

HU 56750 *The interior of No 7A wireless factory, Bontex Knitting Mill, Beresford Avenue, Wembley*

HU 56751 *The interior of No 7A wireless factory, Bontex Knitting Mill, Beresford Avenue, Wembley*

HU 56752 *The interior of No 7A wireless factory, Bontex Knitting Mill, Beresford Avenue, Wembley*

HU 56756 *A Motorised Submersible Canoe (MSC), otherwise known as a "Sleeping Beauty", at the testing tank at St Albans*

HU 56758 *A WELMAN one-man submarine at the launching cradle at Laleham Resevoir, Staines*

HU 56768 *A WELMAN one-man submarine at the Frythe Hotel, Welwyn*

HU 56769 *A WELMAN one-man submarine with dummy warhead attached*

HU 56772 *A WELMAN one-man submarine at the Frythe Hotel, Welwyn*

HU 56774 *A Motorised Submersible Canoe (MSC) in the trials tank at the Frythe Hotel*

HU 56775 *A Motorised Submersible Canoe (MSC) in full buoyancy condition*

HU 56777 *The Welrod: a one-shot silent killing weapon developed by SOE at The Frythe*

HU 56780 *A prototype WELFREIGHTER*

HU 56781 *A prototype WELFREIGHTER*

HU 56783 *A prototype WELFREIGHTER*

HU 56785 *A prototype WELFREIGHTER*

HU 56790 *A prototype WELFREIGHTER*

HU 60560 *Rear exterior of 'The Cottage', situated opposite the main gates of RAF Tangmere, Sussex*

HU 60562 *The rear exterior of the 'Cottage' at Tangmere, 1943*

HU 60563 *The operations room of 'The Cottage' at Tangmere, Sussex*

HU 60565 *Front exterior of 'The Cottage' at Tangmere, 1943*

HU 60566 *The crew room of 'The Cottage' at Tangmere, 1943*

HU 67316 *Women of the Secretarial Staff of Station XII*

HU 67317 *Women of the Secretarial Staff of Station XII*

HU 74810 *A view of Inverie House, Knoydart, Mallaig*

HU 74811 – HU 82554 References correct at time of consulting.

HU 92979 *Vertical photographic-reconnaissance aerial, taken from 8,500 feet, showing the German battleship TIRPITZ*

INS 43105 *Fake Clothing Label produced by SOE for use in Germany*

MGH 4323 *SOE Testing of Weapons and Explosive Devices for Sabotage*

MGH 4324 *SOE Testing of Weapons and Explosive Devices for Sabotage*

MGH 4325 *SOE Testing of Weapons and Explosive Devices for Sabotage*

MUN 213 *Limpet Mine Type VI (camouflaged in petrol tin)*

MUN 214 *Fuze, Anti-Disturbance*

MUN 215 *'Sleeping Beauty' Magnetic Charge*

MUN 216 *'Welmine' Motorised Floating Charge*

MUN 1967 *Switch, time delay, No 10 'Pencil'*

MUN 3067 *Fuze, Delay Action AC*

TRE 397 *Rebecca-Eureka Mk II System*

UNI 5248 *Jump Suit, 'SOE Striptease Suit'*

WEA 722 *Thumb Knife with Sheath*

WEA 3040 *Tyre Slasher, SOE issue*

WEA 4147 *SOE blade concealed in pencil*

WEA 4166 *Fairbairn-Sykes Fighting Knife, 3rd Pattern, with Scabbard*

WEA 4168 *SOE Bodkin or Nail Dagger*

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HS 2/13: *Danish council (UK-based)*

HS 2/14: *Freedom council (Danish-based)*

HS 2/15: *Freedom council's mission to Moscow*

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HS 2/27: *Inter-departmental Danish committee (British)*

HS 2/38: *Free Danes in UK*

HS 2/50: *Freedom broadcasting station*

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HS 2/53: *SOE/OSS liaison*

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HS 2/215: *Operations SCALE, SCALE/OCTAVE, SCALE/QUAVER and SCALE/MINIM*

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HS 4/179: *Organization and administration; air liaison arrangements; pick-up operations; letters of appreciation*

HS 4/185: *Polish training; VIth Bureau wireless training*

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HS 7/18: *Jedburghs in Europe with 2 maps*

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HS 7/33: *Section I signals*

HS 7/34: *Section I signals*

HS 7/35: *Section I signals*

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HS 7/52: *SOE group B training syllabus*

HS 7/53: *SOE group B training syllabus sabotage handbook*

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HS 7/56: *Lecture folder STS 103 part 2*

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HS 7/190: *Stockholm mission 1940-1945*

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HS 8/3: *Circulation of documents*

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HS 8/37: *OSS*

HS 8/41: *OSS/Russia*

HS 8/114: *Organisation and administration*

HS 8/115: *Organisation and administration*

HS 8/116: *Organisation and administration training schools*

HS 8/128: *Air facilities for SOE: requirements and priorities*

HS 8/129: *Air facilities for SOE military and civil requirements*

HS 8/130: *SOE liaison with Air Ministry*

HS 8/133: *Air sorties and priorities*

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HS 8/166: *VAR circuit: operations, orders and interrogations*

HS 8/167: *VAR circuit: signals*

HS 8/174: *VIC circuit: operational orders; interrogations; agents; helpers*

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HS 8/176: *Individual missions: A Robichaud*

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HS 8/197: *Foreign Office/SOE liaison minutes of meetings 12-41*

HS 8/198: *SOE Council minutes*

HS 8/199: *SOE Council minutes*

HS 8/200: *SOE Council minutes*

HS 8/201: *SOE Council minutes*

HS 8/202: *SOE Council minutes*

HS 8/204: *CD's weekly meetings (CD is symbol for Chief of SOE)*

HS 8/207: *Technical committees*

HS 8/209: *War Establishment Board*

HS 8/210: *SOE/SO Headquarters Operational Organisation Committee*

HS 8/211: *Miscellaneous committees: Research and Development; Policy and Planning; Special Craft; Stores Planning*

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HS 8/296: *OVERLORD: security*

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HS 8/306: *Propaganda*

HS 8/307: *Propaganda*

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HS 8/316: *Chiefs of Staff*

HS 8/317: *Liaison with Chief of Staff*

HS 8/318: *Liaison with Combined Commanders*

HS 8/319: *Liaison with Joint Planning Staff*

HS 8/320: *Liaison with MI5*

HS 8/321: *Liaison with SIS*

HS 8/322: *Liaison with War Office*

HS 8/323: *Allied governments liaison*

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HS 8/326: *Liaison with Foreign Office*

HS 8/327: *Liaison with Foreign Office*

HS 8/329: *Liaison with Ministry of Information*

HS 8/330: *Directives: SOE operations*

HS 8/331: *Directives*

HS 8/332: *Directives*

HS 8/333: *Directives: SOE and SO operational arrangements*

HS 8/334: *Staff*

HS 8/335: *Staff*

HS 8/336: *Staff*

HS 8/337: *Property*

HS 8/338: *Ceiling and manpower requirement*

HS 8/339: *Summaries of strength returns*

HS 8/340: *MO1 (SP) (Military Operations 1 (Special Projects)) Manpower returns*

HS 8/342: *Miscellaneous correspondence*

HS 8/343: *AG directorate*

HS 8/357: *Equipment supplies and requirements*

HS 8/358: *Relations with SIS*

HS 8/359: *Supply of Rebecca equipment (beacon/homing device)*

HS 8/360: *Organisation of Communication*

HS 8/361: *SOE signals stations*

HS 8/363: *COMMUNICATIONS Appreciations and exercises*

HS 8/364: *Signal security*

HS 8/365: *Miscellaneous correspondence*

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HS 8/368: *Private Office papers: minister's correspondence (drafts)*

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HS 8/372: *Invasion techniques and fifth column training*

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HS 8/780: *Helford base: closure*

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HS 8/783: *Liaison with Admiralty*

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HS 8/789: *Sleeping Beauties: visits to allied service departments*

HS 8/790: *Shetland Base: provision of vessels*

HS 8/792: *Naval establishment training ship 'orca'*

HS 8/793: *Welman policy: miniature submarines*

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HS 8/796: *Welmans: contracts, modifications*

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HS 8/901: *Correspondence with Right Honourable Anthony Eden*

HS 8/915: *Correspondence with Right Honourable Lord Leathers, Minister of War Transport*

HS 8/917: *Correspondence with Right Honourable Sir Kingsley Wood, Chancellor of Exchequer*

HS 8/919: *Correspondence with Chiefs of Staff, War Cabinet Secretariat and War Office officials*

HS 8/920: *Correspondence with ministers*

HS 8/921: *Correspondence with officers and officials of HM government*

HS 8/924: *Correspondence with Major Sir Desmond Morton*

HS 8/930: *Miscellaneous correspondence*

HS 8/959: *Irregular operations; assessments*

HS 8/960: *Special training schools*

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HS 8/967: *SOE council, headquarters boards and directorates Symbols*

HS 8/968: *SOE council, headquarters boards and directorates Symbols*

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HS 8/981: *American section G and GN symbols*

HS 8/998: *France*

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HS 8/1014: *SOE operational code names*

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HS 8/1021: *Report to Minister of Economic Warfare on organisation of SOE by J Hanbury Williams by J Hanbury Williams*

HS 8/1024: *SOE reports on accounts and expenditure*

HS 9/8/3: *Marguerite Helen ADAMS - born 13.10.1906*

HS 9/34/3: *Rosemary Millicent ANDERSON - born 22.09.1917*

HS 9/117/2: *Gerhard Adolf BEKKEVOLD - born 29.09.1911*

HS 9/415/1: *Daniel Louis DELIGANT - born [1905]*

HS 9/500/1: *Rita Lillian Elsa FARROW nee VALLOTTON - born 23.10.1909*

HS 9/750/1: *Eric HOWARD - born 22.06.1908*

HS 9/986/2: *Max MANUS - born 09.12.1914*

HS 9/1270/2: *Albert ROBICHAUD - born 18.02.1916*

HS 9/1433/7: *Johannes Henricus SYBEN, aka Johannes H SCHOUTEN, aka J H SCHOONEN, aka HENDRIKUS - born 30.08.1919*

HS 9/1605/3: *John Skinner WILSON - born 20.05.1888*

HS 10/1: *Photograph album with views of an exhibition recording the work of SOE station 15b*

HS 11/1: *Agoston, Ivan - Mylonakos, George*

HS 11/2: *Nablus - De Zuyter, Christian*

HS 19/1: *Adamson, J C - Young, W B.*

HW 34/1: *Miscellaneous manuscript notes on RSS history*

HW 34/2: *RSS(I) note: The Funkabwehr*

HW 34/3: *RSS traffic report*

HW 34/4: *RIS1-24, RIS19A and 25-34*

HW 34/5: *Radio Security Intelligence Conferences*

HW 34/6: *Minutes of 66th and 91st Radio Security Intelligence Conference*

HW 34/7: *Minutes of 92nd and 101st Radio Security Intelligence Conference*

HW 34/8: *Polish transmitters in UK*

HW 34/9: *Polish affairs*

HW 34/10: *Polish affairs*

HW 34/11: *Polish affairs*

HW 34/12: *Polish affairs*

HW 34/13: *Radio Board: Polish supplies*

HW 34/14: *Polish supplies*

HW 34/15: *Polish Clandestine Communications Committee*

HW 34/16: *Polish WANDA stations*

HW 34/17: *Committee and management of Polish SOE factory at Stanmore*

HW 34/18: *Mobile units (personnel and operations)*

HW 34/19: *Captured enemy agents, sets and equipment*

HW 34/21: *Provision of radio equipment by the RSS to the Polish station at Stanmore*

HW 34/22: *Operations in Europe*

HW 34/23: *Russian transmitters in UK*

HW 34/24: *American transmitters in UK*

HW 34/25: *Czech transmitters in UK*

HW 34/26: *Other Allied transmitters in UK*

HW 34/27: *French affairs*

HW 34/28: *French plans sponsored by a P section (communications liaison between the RSS and the French)*

HW 34/29: *Norwegian affairs*

HW 34/30: *Special Communications Unit No. 3 Senior Officers Conferences*

HW 47/1: *London Poles, Stanmore*

HW 47/2: *The polish cyphers for diplomatic and consular traffic*

HW 47/3: *Reports on polish diplomatic and military communications*

HW 47/4: *British supervision of Polish radio communications*

KV 4/20: *Report on security service's regional organisation*

PREM 3/223/5: *Auxiliary Units*

PREM 3/365/3: *Operation ASPIDISTRA*

WO 166/3529: *Royal Engineers Boring and Tunnelling Units 1 Boring Section*

WO 166/3530: *Royal Engineers Boring and Tunnelling Units 2 Boring Section*

WO 166/3535: *Royal Engineers Boring and Tunnelling Units 1 Tunnelling Engineers*

WO 166/3652: *Royal Engineers Companies 171 Tunnelling Company*

WO 166/3653: *Royal Engineers Companies 172 Tunnelling Company*

WO 166/3654: *Royal Engineers Companies 173 Tunnelling Company*

WO 166/3655: *Royal Engineers Companies 179 Tunnelling Company*

WO 166/3656: *Royal Engineers Companies 183 Tunnelling Company*

WO 166/3657: *Royal Engineers Companies 184 Tunnelling Company*

WO 166/3658: *Royal Engineers Companies 185 Tunnelling Company*

WO 166/8104: *171 Tunnelling Company*

WO 166/8105: *172 Tunnelling Company*

WO 166/8106: *ROYAL ENGINEERS: FIELD COMPANIES: 174 Company*

WO 166/8107: *179 Special Tunnelling Company*

WO 166/8108: *ROYAL ENGINEERS: FIELD COMPANIES: 181 Company*

WO 166/8109: *183 Special Tunnelling Company*

WO 166/8110: *184 Special Tunnelling Company*

WO 166/8111: *185 Special Tunnelling Company*

WO 166/12075: *172 Tunnelling Company*

WO 166/12076: *174 Coy.*

WO 166/12077: *175 Coy.*

WO 166/12078: *176 Coy.*

WO 166/12079: *177 Coy.*

WO 166/12080: *179 Coy.*

WO 166/12081: *180 Coy.*

WO 166/12082: *181 Coy.*

WO 166/12083: *183 Company (formerly 183 Special Tunnelling Company)*

WO 166/12084: *184 Company (formerly 184 Special Tunnelling Company)*

WO 166/12085: *185 Company (formerly 185 Special Tunnelling Company)*

WO 166/16349: *Auxiliary Units*

WO 193/153: *Lessons from enemy campaigns and methods: subversive activities and sabotage*

WO 193/824: *"Braddock" and "Aspidistra" plan to drop incendiary weapon for sabotage inside Germany*

WO 199/1194: *G.H.Q. auxiliary units*

WO 199/1517: *Auxiliary unit shelters; construction arrangements*

WO 199/1955: *Transport: Auxiliary units - Stores*

WO 199/1980: *Wireless Intelligence network: Organisation of 'Beetle' R.T. System*

WO 199/2151: *H.Q. Auxiliary Units*

WO 199/2889: *Home Guard Hideouts*

WO 199/2892: *Home Guard Auxiliary units*

WO 199/3251: *Letters to and from the War Office concerning Auxiliary units*

WO 199/3265: *Correspondence on Auxiliary Units*

WO 199/3388: *Scotland and Northumberland Nominal Rolls Auxiliary Units*

WO 199/3389: *Northern and Eastern counties and Hereford and Carmarthen areas*

WO 199/3390: *Dorset, Kent and Somerset areas*

WO 199/738: *Auxiliary units*

WO 199/739: *Auxiliary units*

WO 199/936: *Auxiliary units: stores and supplies*

WO 199/937: *Auxiliary units: stores and supplies*

WO 204/10262: *OSS organisation and tactics*

WO 204/12334: *Key German businessmen who have, or may have, information on German espionage and subversion*

WO 208/2060: *Subversive attitude of communist press in Britain*

WO 208/3131: *Allied occupation of Germany: guerrilla and underground resistance*

WO 208/3530: *Notes of subversive activities at POW Camp Comrie, Scotland*

WO 219/2308: *Operation Aspidistra*

WO 219/5095: *Resistance and subversive movements in Germany*

WO 219/5096: *Resistance and subversive movements in Germany*

WO 219/5112: *Proposed wireless transmission which would appear to come from subversive factions inside Germany*

WO 219/931: *Airfield construction policy*

WO 315/18/18: *18/18. Documents regarding Polish Military Wireless Research Unit in Stanmore.*

National Monument Record, English Heritage

Enquiry Number	Site	Search radius (m)	Centre Point	Vertical APs	Oblique APs
64256	Aston House	1500	527100, 222400	164	0
64405	Poundon	1500	463700, 225100	79	0
65058	Gaynes Hall	1500	514663, 266220	59	0
65384	Brickendonbury	1500	533000, 210400	105	29
65429	The Frythe	1500	522500, 215000	200	9
65436	Grendon Hall	1500	468200, 222000	32	58
65865	The Thatched Barn	1500	521143, 196752	119	0
66489	Hallplace Farm	1500	482173, 182047	82	0
68132	Bride Hall	1500	519053, 215944	61	42
68134	Brock Hall	1500	463262, 262667	39	111
68815	Frogmore Hall	1500	528939, 220722	209	7
69292	Holmewood	1500	518494, 288106	51	0
69538	RAF Tempsford	1500	518819, 252676	37	10

69840	Stodham Park	1500	477083, 126104	83	1
69994	Thame Park	1500	471656, 203741	96	28
70141	Hatherop Castle	1500	415314, 205126	51	62
70228	Vineyards	1500	438799, 103070	58	64
Order 70228 also covered Blackridge, Boarmans, Clobb Gorse, Drokes, Harford House, Saltmarsh, The House in the Wood, The House on the Shore, The Rings and Warren House.					
70396	Chicheley Hall	1500	490558, 245850	43	84
70492	Dunham House	1500	373494, 387406	90	15
70588	Winterfold	1500	507316, 141936	61	7
70658	Roughwood Park	1500	500360, 195389	169	0
70858	Wanborough Manor	1500	493495, 148933	49	3
71191	Anderson Manor	1500	388018, 97603	73	31
71267	Gorhambury House	1500	511374, 207854	87	213
72102	Charndon	1500	467485, 224763	61	2
72607	Fulsham Hall	1500	384380, 380079	85	9

The Norwegian Resistance Museum

049113 Photograph

038003 Photograph

038004 Photograph

034018 Photograph

038028 Photograph

038035 Photograph

038040 Photograph

038046 Photograph

038065 Photograph

042008 Photograph

049093 Photograph
049111 Photograph

RAF Museum

Tempsford Record Site Plan DGW 4330/44
Tempsford Record Site Plan DGW 4331/44

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