City of York Council

A1237 York Northern Outer Ring Road: Clifton Moor Junction

DEMOLITION OF FORMER AIRFIELD STRUCTURES REPORT

MARCH 2020

barton•howe associates

barton•howe associates

A1237 YORK NORTHERN OUTER RING ROAD (YNORR):
CLIFTON MOOR JUNCTION

DEMOLITION OF FORMER AIRFIELD STRUCTURES REPORT:

ARCHAEOLOGICAL INVESTIGATIONS AND RECORDING

March 2020

Submitted to:

City of York Council
West Offices
Station Rise
York
YO1 6GA

Status:
Final

Report Number:
17/1027/PFCL/CMASR/V.1

Barton Howe Associates Ltd. IT Centre, York Science Park, Innovation Way, Heslington, York YO10 5NP

Tel: 01904 567711 Email: office@bartonhowe.com Web: www.bartonhowe.com

Contents

Figures

Appendices

Plates

Cover: Clifton Moor Airfield, machine gun range north wall of gun butts

EXECUTIVE SUMMARY

Several structures associated with the former RAF Clifton airfield, on Clifton Moor, York, were subject to archaeological recording in late November/early December 2019, prior to their proposed demolition as part of planned junction and other highway works associated with the York Northern Outer Ring Road improvement scheme. The archaeological work included detailed measured survey, structural recording and limited excavation.

Land for an airfield at this site was originally purchased by York Corporation in June 1934, and it was opened in 1936 and operated by Yorkshire Aviation Services. The airfield was then requisitioned by the RAF in September 1939, and during its lifetime it was used by RAF Bomber Command, RAF Army Co-operation Command, the Fleet Air Arm, RAF Fighter Command and RAF Maintenance Command. Between 1941 and 1948, the site became an important Civilian Repair Unit for the nearby Yorkshire operational airfields which used Halifax bombers. Several large engineering complexes were built and some 4,000 people were employed at the works, mostly women; more than 2,000 Halifax bombers were repaired here during the war. The airfield was also used by various other RAF squadrons, flying Westland Lysanders and single-seater American fighters, and the site was bombed and damaged during the York 'Baedeker' raid of 28th-29th April 1942. The RAF left in 1946 but the site was used to dismantle a large number of Halifax bombers up until 1948. Part of the military airfield also returned to civilian use for a short period of time, but the site was officially closed in 1952. Much of the former military infrastructure survived until the 1980s, when most of the airfield on the south side of the A1237 was developed for housing and the Clifton Moor Retail Park.

The structures recorded by the survey, namely sections of the runways and perimeter taxi-ways, a bulk petrol installation, a machine gun range and cannon 'shooting-in' butts, are associated with an expansion of the RAF airfield in late 1942. The runways and taxi-ways are of sectional concrete construction covered with asphalt, and both preserve parts of a Drem Mk II lighting system, as well as contemporary drainage. The cannon butts incorporate six bays into which machine guns mounted in fighter airplanes would have been fired, having been secured to an area of hardstanding accessed from the airfield perimeter taxi-way. The butts at the machine gun range is a more substantial feature, although little now remains of the actual firing shed - the range would have been used by RAF personnel to maintain their ground defence training. Both sets of butts are relatively well-preserved, and are similar to examples surviving or noted elsewhere at other former RAF airfields.

Limited excavation at the bulk petrol installation revealed that, despite extensive disturbance in the post-war period, it was relatively well preserved. The installation lies on the western edge of the airfield, and it is surrounded by an elliptical concrete roadway to facilitate the movement of tankers. The two linear 12,000 gallon petrol tanks had been removed, but they had been housed in above-ground brick chambers. The floor of each chamber contained brick piers to support the tank, and anchor points were used to secure steel cables running over and across the tank. Earlier photographs suggest that the chambers were provided with a reinforced roof, accessed by concrete steps, and each chamber was surrounded by an earth bank for security and protection. Two pump houses were equipped with a pump and motor unit, and associated starter gear; the northern pump house would have received the petrol while the southern pump house incorporated a stand post to supply tankers for dispersal of the petrol to the airfield.

1 INTRODUCTION

Reasons and Circumstances for the Project

Several structures associated with the former Clifton airfield, on Clifton Moor, York, were subject to archaeological recording prior to their proposed demolition as part of planned junction and other highway improvements associated with the York Northern Outer Ring Road improvement scheme.

The work included detailed measured survey, structural recording and excavation. The scope of the work was determined by a Written Scheme of Investigation (WSI) (see Appendix 2) which was discussed with, and agreed in advance with, the City of York Council's City Archaeologist. The fieldwork was undertaken in late November/early December 2019, after some vegetation clearance.

2 SITE LOCATIONS AND SUMMARY DESCRIPTIONS

Three individual structures were investigated and recorded, all lying on the north side of the existing A1237 road adjacent to the Clifton Moor roundabout (see figures 1 and 2). Described from west to east, these structures comprised the remains of a bulk petrol installation (NGR SE 58232 55401 centred), the remains of former airfield runways and taxi-ways (NGR SE 5845 5556 centred), and the remains of cannon testing butts and a machine gun range (NGR SE 59156 55746 centred). All three sites were inspected in detail as part of a previous Cultural Heritage Simple Assessment Report, and the bulk petrol installation was subject to a pre-intervention earthwork survey in late February/early March 2019 (BHA 2019); the sites were identified in this Assessment Report as Sites 9, 1 and 8 respectively. None of the sites have any statutory protection.

Bulk Petrol Installation

An Air Ministry Record Site Plan made in November 1945 depicts the whole of the Clifton airfield, with the bulk petrol site numbered as '25b' and named as a 'Bulk Petrol Installation (24,000 gallons)' surrounded by an elliptical concrete roadway (YCA Y/ORD/4/6/52) (see figure 3A). It is similarly depicted on post-war Ordnance Survey mapping but in slightly more detail (see figure 3B). The site escaped the extensive re-development of the rest of the airfield which took place during the 1980s, but structures were partially demolished at some point between 1988 and 2002. Fortunately, a number of photographs were taken in 1988 prior to this demolition (see figure 3C). Although now mostly demolished, the remains of the site are clearly visible on 2015 modern colour vertical aerial photography (Google Earth) (see figure 3D).

At the time of the current project, the remains of the bulk petrol installation were formed by two elongated earth mounds formerly containing the petrol tanks, both aligned approximately north-south and containing exposed brickwork on their surfaces (see figure 4). The mounds were separated by an area of brick and concrete rubble representing the demolished remains of two small pump houses; a metal stand post associated with the south pump house still survived. The whole was surrounded by an elliptical concrete roadway, covering an area 40m square, which would have allowed tankers to both bring petrol to the facility and to take petrol out to the aircraft which were dispersed around the airfield. The installation lies on the north-western edge of the former airfield, close to a perimeter taxi-way.

Airfield Runways and Perimeter Taxi-ways

The site comprises the northern ends or thresholds of two of the former airfield's shorter runways (labelled as Nos 5 and 6 on the 1945 airfield plan), together with parts of their associated perimeter taxi-ways (see below). They are still shown on the Ordnance Survey maps of 1958 (see below). Comparison of contemporary aerial photographs suggests that the runways and taxi-ways were probably built in around June 1943, as part of an airfield expansion (BHA 2019, 14). They are of sectional concrete construction covered with asphalt; where the edges can be seen, the concrete panels have an average thickness of 0.10m. The majority of the surfaces were badly overgrown with moss, grass, bushes and small trees, which was mostly cleared to facilitate the survey work.

The eastern perimeter taxi-way is aligned north-north-west/south-south-east, with a surviving length and width of c.230m and c.11m respectively. At its northern end, it curves around to the north-west to meet the north threshold of the eastern runway (No. 6). The surviving portion of this eastern runway on the north side of the A1237 road is c.230m long by c.45.50m wide. A central perimeter taxi-way leaves its northern end to run south-west to the northern threshold of the western runway. The western runway (No. 5) is set on a north-west/south-east alignment, and the surviving northern portion is c.90m long by c.45.50m wide. The western perimeter taxi-way leaves the north end of the western runway and curves around to the south-west for some c.100m to pass close to the bulk petrol installation. All surviving parts of the runways and taxi-ways preserve evidence for former associated lighting and drainage systems.

The areas between the runways and taxi-ways is now occupied by recently planted woodland, some of which has been planted using a 'ripping' technique which had resulted in significant rutting to the ground surface. It is to be expected that these areas would not have contained any significant wartime remains, although some elements associated with lighting and drainage may have been present. On the east side of the site, an area of plantation lies between the eastern taxi-way and Moor Lane, known as Poplar Plantation; it is shown on the 1945 plan of the airfield and 1946 aerial photographs.

Poplar Plantation now extends further to the south, up to the edge of the A1237 ring road, and this southern area has been identified as the possible location of an aircraft breaking area, used both during the war and in the immediate post-war period (Wenkel, Lang & Sainsbury 2018). An irregularly-shaped mound in this area appears to have been partly formed by clearance of on-site structures or dumping that had started by 1946, and which may have continued until at least 1967-69. A single ruined structure in this area does not appear on the 1945 airfield plan but was present by the late 1960s; this was included in the current survey work although the wider Poplar Plantation was not.

Cannon Testing Butts and Machine Gun Range

The cannon butts and machine gun range lie adjacent to each other, within an area of dense scrub and woodland which was cleared to facilitate the archaeological recording.

On the 1945 airfield plan, the cannon testing butts are erroneously numbered '24', and labelled as 'NFE (night fighter equipment) Store' (YCA Y/ORD/4/6/52) (see figure 5A); they should be numbered '23' which the key identifies as 'Canon Test Butt' (BHA 2019, 21). The site is still depicted on the 1967-69 Ordnance Survey map, and it remains visible on recent aerial photography (see figures 5B and 5F). The butts are formed by a c.11m long brick structure standing over 4m tall, supporting a sand scarp or bank to the south side. Some 13m to the south of the butts is the north end of a square hard-standing area. The hard-standing formed an aircraft tethering apron, where the fighter plane using the butts would have been positioned. A taxi-way to the south runs to within 3m of the modern post

and rail fence/hedge marking the north side of the A1237. A brick-lined drain or sump to the west may also date to the Second World War.

The machine gun range lies just to the north-east of the cannon butts, and is numbered as '22' on the 1945 airfield plan and labelled as 'M.G. (machine gun) Range (6 Point)' (YCA Y/ORD/4/6/52) (see figure 5A). The main surviving part is the butts themselves, formed by a c.40m long buttressed brick wall standing to over 6m in height, supporting a substantial sand scarp or bank to the south side. Positioned some 3m to the south-east of the butts, and running parallel to them, is a linear depression forming the catch pit or trench. The covered firing point was positioned some 7.50m south-east of the catch pit, and c.14m south-east of the butts themselves. This has been largely demolished, and the principal remains are formed by the concrete pad which formed the base and a few brick pillars supporting the former roof.

3 SURVEY METHODOLOGIES

Aims and Objectives

In accordance with the approved WSI (see Appendix 2), the aims and objectives of the project were:

(1) to identify and objectively record all above-ground remains associated with the former airfield runways and taxi-ways, and the cannon butts and machine gun range, on the north side of the A1237 ring road, through a combination of non-intrusive survey work such as EDM and hand-held survey, photographic and descriptive techniques;

(2) to evaluate and assess the below-ground remains of the bulk petrol installation, through intrusive survey work involving the excavation of two or three machine-excavated archaeological trenches, together with hand-held survey, photographic and descriptive techniques;

(3) to describe, analyse and interpret the remains of the three sites in terms of their specialist functions, and to place that analysis and interpretation into the wider context of the wartime airfield and other similar examples from other known locations;

(4) to produce appropriate recommendations for any further work required at the three sites, prior to their demolition and removal as part of the proposed road improvement scheme;

(5) to produce an ordered archive and report, and to place these in the public domain, namely the Yorkshire Museum and the Archaeology Data Service in York for the project archive, and the City of York's Historic Environment Record for the survey report.

General Comments

The scale and scope of the project was determined by the WSI (see Appendix 2). The above-ground survey work conformed to a Level 3/4 survey, as outlined by Historic England; for landscapes, a Level 3 survey produces an enhanced and integrated record (English Heritage 2007, 23), while for historic buildings and structures, a Level 4 survey results in a comprehensive analytical record (Historic England 2016, 27). The below-ground evaluation work conformed to all current established guidelines produced by Historic England (e.g. English Heritage 1991 & 2006).

Additional standards and guidance published by the Chartered Institute for Archaeologists (CIfA), relating to the investigation and recording of standing buildings or structures, archaeological field

evaluation, the collection, documentation, conservation and research of archaeological materials, and the creation, compilation, transfer and deposition of archaeological archives, were followed (CIfA 2014a-d). Other guidance produced by City of York Council for archaeological building recording and site evaluation was also taken into account.

The fieldwork was undertaken in late November/early December 2019, after vegetation clearance.

Documentary Research

No new documentary research was undertaken as part of the works. The previously published Simple Assessment Report (BHA 2019) contains a considerable amount of information collected on both the airfield and the three sites subject to this phase of survey work. This included the examination and collation of material held in local archives such as York City Archives, the Borthwick Institute at York University, and the North Yorkshire County Record Office, and additional material was obtained from the RAF Museum in Hendon, such as the original designs for standard airfield bulk petrol installations and machine gun ranges.

Information from the City of York Council's Historic Environment Record and Historic England's 'Heritage Gateway' database (which provides links to the National Heritage List for England, the National Record of the Historic Environment (Pastscape) and the National Monument Record Excavation Index) had also been collected and collated for the previous Simple Assessment Report. A full list of the archives and sources consulted is given in the Bibliography (Chapter 8 below).

Non-Intrusive Archaeological Survey

As noted above, the former airfield runways and taxi-ways, and the cannon butts and machine gun range, were subject to detailed non-intrusive archaeological surveys.

Vegetation Clearance

Prior to the start of any survey work, both sites were subject to intensive vegetation clearance to aid the identification of upstanding and above-ground remains; this work was undertaken under appropriate archaeological supervision. On the runways and perimeter taxi-ways, a combination of machine-mounted flails and a 360 mechanical excavator equipped with a wide, toothless ditching blade or bucket were used to clear the vegetation (i.e. moss and low grass etc) from the flat surfaces, so that as many of the joints between the concrete construction panels as possible were visible. Other small trees and brambles etc were cut down to ground level, but were not pulled out so as to avoid damage to the runway/taxi-way structures. The cleared vegetation was collected and placed in bunds, either along the edges of the adjoining plantation or along the runways/taxi-ways, so that surfaces and sight lines remained clear.

The vegetation at the cannon butts and machine gun range site was much more dense, with areas of thick brambles together with larger trees and shrubs. This was cleared to ground level using a combination of machine-mounted flails and strimmers, with larger bushes and trees being felled. The aim was to provide clear sight lines between and around upstanding remains, such that their arrangement and context were visible. Care was taken to ensure that there was no damage to any upstanding structures during the clearance work, for example by tree felling. Cleared vegetation was collected and placed in non-archaeologically sensitive parts of the site, prior to subsequent chipping and removal.

Measured and Drawn Survey: General Site Plans

An overall general ground level site plan was produced for each site using EDM total station equipment. Sufficient information was gathered to allow the survey areas and sites to be readily located through the use of surviving structures, fences, walls, trackways and other topographical features. The survey recorded the ground level position of all structures, wall remnants and revetments, earthworks, water courses, paths, stone and rubble scatters, ironwork, fences, walls and other boundary features, and any other features considered to be of archaeological or historic interest. These EDM site surveys paid particular attention to those specific structures that were subject to more detailed recording, by providing a greater degree of detail such that accurate footprint drawings could be produced.

Both site surveys were produced as separate divorced surveys. They were integrated into the Ordnance Survey national grid by resection to points of known co-ordinates. Heights AOD were obtained by reference to the nearest OS bench mark; given the nature of the remains, contours were not plotted across the site. Survey points were taken from fixed survey stations on a closed traverse around and through the site. The locations, descriptions and values of the bench marks and control points are stated in the final survey data. On completion of the EDM total station survey, the field data were plotted and re-checked on site in a separate operation. Any amendments or additions were surveyed by hand measurement, and the results digitised back into the electronic survey data.

The resulting ground level site surveys were produced at a scale of 1:500 for the runways/taxi-ways, and 1:200 scale for the cannon butts and machine gun range. They have been presented as interpretative hachure plans using conventions analogous to those used by Historic England (English Heritage 2007, 31-35). The final product arising from the site surveys was a series of hand-drawn wet ink hachure plans, although AutoCad (or equivalent) electronic data is also available if required. Larger scale plans, at 1:10,000 and 1:2,500 scale, were used to put the survey areas into context.

Measured and Drawn Survey: Detailed Site Plans

Specific structures or areas of interest within the two sites were drawn at a more detailed scale. A plan of the machine gun butts at a scale of 1:100 was constructed, together with a combined elevation/cross-section at a scale of 1:50. In terms of the airfield runways and taxi-ways, the ruined structure within the plantation at the former north-east corner of the airfield was planned at 1:50. Typical surviving examples of runway and taxi-way lights were excavated, cleaned and drawn at a scale of 1:5.

The ground-level plans used the above EDM total station footprint surveys as a base, enhanced by detailed hand measurement techniques. The resulting drawings show all significant detail such as openings (blocked or unblocked), inserted doorways, fittings, joist sockets etc. All drawings were produced according to the guidelines established by Historic England (2016, 14), and were keyed into the general site plans.

Photographic Survey

A general photographic record of the survey areas, and the features and structures within them, was undertaken, in accordance with Historic England guidelines (2016, 17-21).

Photographs of specific structures were taken, as far as was possible, at both right angles and oblique angles to the external elevations, to show all external elevations and to record the overall impression

of the structure's size and shape. Further external views were also taken to reflect the original design and layout of the structure, and all external or other detail, such as signage, structural or decorative items, graffiti etc was also recorded. Finally, general views of the recorded structures, and the overall sites, were taken to place them into context. Each photograph was provided with a scale, and artificial lighting and tripods were used where necessary, subject to practicalities and access.

An SLR digital camera with 12 mega-pixel resolution was used, and Historic England guidelines in relation to digital image capture and file storage were followed (Historic England 2015). All photographs were taken in both RAW and jpeg formats - the latter was used for illustrative purposes only, and do not form part of the site archive. The RAW photographs were converted to an uncompressed 8-bit TIFF format for the purposes of the archive. Processed photographs were not manipulated or altered prior to inclusion in the project archive. All photographs were clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and were cross referenced to film and image numbers. A photographic catalogue detailing the location and direction of each photograph was completed, and the location and direction of each photograph has been noted on the relevant plan. The photographic catalogue appears as Appendix 1.

Written Accounts

Sufficient notes were taken on site in order to allow a detailed description of the larger areas or specific buildings/structures to be prepared, illustrated by the drawn and photographic records.

Intrusive Archaeological Investigation

As previously noted, the above-ground remains at the former bulk petrol installation were recorded in late February/early March 2019 (BHA 2019, 23-25). The current work comprised a limited programme of archaeological evaluation, through the excavation of two trial trenches and the clearance of rubble from key areas. The trenches were excavated on an east-west alignment through the two linear mounds at the installation, with a view to confirming the presence or absence of any surviving petrol tank structures; these trenches were up to 13m long and 4.30m wide, the greater width being necessary where the trench exceeded 1.20m in depth. Clearance of surface rubble was also undertaken across the north and south pump houses, in order to better determine their original form and foundations.

On Site Excavation and Recording

The trenches were opened using a 360 mechanical excavator with a wide, toothless ditching blade or bucket, to reveal the internal structure of the mounds; the mechanical excavator was under direct archaeological supervision at all times. Spoil was positioned to one side of each trench so as to minimise land-take. After initial machining, and once structures had been revealed, all excavation was undertaken by hand. In the event, the tank structure within the western mound ('A') was found to be better preserved than that within the eastern mound ('B'), and so an additional sample area was excavated and cleaned to understand the structure as originally built.

A full written, drawn and photographic record was made of all material and features revealed during the course of the evaluation. All excavated archaeological contexts were recorded by detailed written records giving details of location, composition, shape, dimensions, relationships, finds, samples, and cross-references to other elements of the record and other relevant contexts, in accordance with best industry practice and current recording guidelines. Fieldwork records were indexed, ordered, quantified, and checked for consistency. The position of each trench was plotted on the existing pre-

intervention plan of the 1:100 scale petrol installation made in 2019, which was also updated with the new information revealed by the rubble clearance; in addition, part of the trench through mound 'A' was drawn at the larger scale of 1:50 to show relevant detail. Representative sections at a scale of 1:50 were made of both trenches, and 1:5 drawings were made of *in situ* and *ex situ* metal fittings from mound 'A'. A full digital photographic record was kept (minimum 12 megapixel resolution), in both RAW and jpeg formats, and this recorded individual exposed features and structures, as well as providing more general shots of the site and the excavations.

All trenches were backfilled and reinstated immediately after excavation and recording had been completed, to avoid unauthorised public access. The site was left in a tidy and clean state on completion of the fieldwork programme. No finds were recovered during the intrusive archaeological investigations.

Reporting

As required by the approved WSI, this detailed survey report includes a summary of the historical background to the recorded sites, the results of the fieldwork and evidence supporting any interpretations, a number of conclusions (including an assessment of the importance of the recorded sites in relation to any other remains in the general area as a whole), and any recommendations for any further analysis or work. The report is illustrated with appropriate plates and figures, including reduced versions of the survey drawings. The final report was distributed to York City Council, the City of York Council's Historic Environment Record, and other interested parties in an electronic pdf format.

Archive

A fully indexed field archive has been prepared, following the guidance produced by Historic England and others (e.g. Brown 2011; CIfA 2014b). The archive comprises primary written documents, plans, sections and photographs, a hard copy of the final report, and an index to the archive. All material was stored in archival-stable material.

The main archive was deposited with the Yorkshire Museum while the digital elements were deposited with the Archaeology Data Service in York. In all cases, all deposition guidelines and requirements were followed, e.g. in relation to file formats and associated catalogues, and deposition charges.

4 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

The following text is largely taken from the previous Cultural Heritage Simple Assessment Report (BHA 2019, 12-17). This was in turn collated from a number of published sources, including Otter (1998, 295-296), Halpenny (1982, 201-202), Spence (1999), Wenkel, Lang and Sainsbury (2018), and various internet sources listed in the Bibliography below. Other specific authors are listed where relevant.

A civilian airfield was opened at Clifton Moor in July 1936, although the suitability of the site had apparently been established several years earlier when it was used by Sir Alan Cobham for one of his famous air pageants. It was reputedly this event that encouraged local farmer and City Councillor Albany Holmes, with some of his neighbours, to offer York Corporation some land for the construction of an airfield. The Corporation then received a formal request from Yorkshire Aviation Services and Country Club Ltd to have the use of an airfield from which to operate a flying club and air taxi service; they were then operating from Leeming Bar aerodrome. The company offered to manage the airfield, to provide aircraft and employ pilots and ground staff, and build all the necessary facilities. A firm of

consultants surveyed the site and confirmed its suitability, and the land was compulsorily purchased by York Corporation in June 1934 after a public inquiry; the site covered a total of 163 acres although only 60 acres were initially used. The venture was to be officially called York Municipal Aerodrome, but its location gave rise to commonly accepted name of Clifton airfield.

Construction work on the green field site started soon after, with En Tout Cas Ltd of Syston (Leicestershire) laying out a circle 600 yards (549m) in diameter, and local firms were engaged in drainage and other groundworks, the latter involving the removal of 6,000 yards (54.8km) of hedgerows. The site lay to the south-east of Rawcliffe village, and was bounded on the east and south by Nova Scotia Lane and Green Lane respectively (see figure 6). The airfield was opened on 4th July 1936 with a local display of Hawker Audax biplanes from No. 26 (Army Co-operation) Squadron based at Catterick, and there were around 70 other private airplanes on view. Some 7,550 people attended the opening. The cost of the airfield was approximately £18,600, the money primarily going on the purchase of the land (163 acres at £75 per acre) and drainage and other groundworks (£82 per acre); the single grass runway was 600 yards long.

A handbook, produced by Yorkshire Aviation Services in c.1938 (YCA HMU/14/20), includes photographs of the clubhouse and hangar at the airfield and also an outline plan, subsequently reproduced by Spence (1999, 17-19); there are also modern photographic copies and slides in York City Archives (YCA HMU/P/9/61-70 & HMU/L/22/19). The map shows that the main access into the airfield was from Green Lane, close to its junction with Rawcliffe Lane, with the majority of the buildings located in the south-west corner of the airfield. The clubhouse was built by Collins and Murray Ltd, and fire fighting and first aid equipment was supplied and serviced by John C Enright of Cookridge, Leeds (Benfield *nd*). A second phase of expansion involved the building of a new hangar, a bungalow along Green Lane for the site manager, a new concrete apron and car park, and an improved entrance road. The York club became a well-established centre for flying enthusiasts, and another air pageant was held in June 1937 which was viewed by a crowd of some 10,000 and attended by some 150 pilots from seven countries. However, day-to-day activity at the airfield was limited to club flying and an air taxi service.

In 1938, in response to the Munich Crisis, the Air Ministry decided to form a Civil Air Guard, to allow established pilots to be used for domestic tasks, thus relieving service pilots for operational flying. A contract was given to Yorkshire Aviation Services to provide pilots to act as flying instructors, using their three or four Gipsy Moth aircraft. Slightly later, the company was also asked to train pilots directly for the RAF for a few months. The airfield is depicted on the 1941 Ordnance Survey 25" maps (revised in 1938), as one large open space, i.e. the field boundaries and hedgerows have been removed, with a small collection of buildings in the south-west corner, one marked as the 'Club House' (see figure 7); at this time, the airfield still covered the area shown on the original plan.

The airfield was requisitioned by the RAF in September 1939, and during its lifetime it was used by RAF Bomber Command, RAF Army Co-operation Command, Fleet Air Arm, RAF Fighter Command and RAF Maintenance Command (*http://www.cliftonwithout-pc.org.uk)*. It was initially used as a 'scatter' site for bombers of the 51st and 58th Squadrons based at Linton-on-Ouse, but in December 1939 it was taken over by Army Co-operation Command and used by 4th Army Co-operation Squadron, which was equipped with Westland Lysanders. Armstrong Whitworth also set up some repair and maintenance facilities at the site, for the Whitleys then in use on nearby airfields. By April 1940, a hutted camp had appeared around the old clubhouse and hangar in the south-west corner of the site, and for the first year it remained as a grass airfield (YCA HMU/14/20). A Luftwaffe target photograph of the airfield also exists (Wenkel, Lang & Sainsbury 2018, 12); although undated, it was probably taken in mid 1940 as the airfield is shown in its pre-war, pre-development, state.

The airfield was first constructed as a relief landing ground and dispersal site for the nearby operational site at Linton-on-Ouse (Halpenny 1982, 210). A decoy airfield was also established at Bugthorpe, East Yorkshire, from 1941 to 1944, but it was little used. The first RAF squadron to use the airfield was No. 613 Squadron, between 7th September 1940 and 8th July 1941, as a detachment from the main squadron who were based at RAF Firbeck in South Yorkshire. In August 1940 No. 4 Squadron RAF had also arrived, originally with Westland Lysanders and then single-seater Curtiss Tomahawks in April 1942 and North American P51 Mustangs in May 1943 (Jefford 1988).

Although it was never used for any length of time as an operational bomber station, many hundreds of four-engined Halifax bombers used the airfield between 1941 and 1948. The site became a Civilian Repair Unit (CRU) for the nearby Yorkshire airfields which used Halifaxes. Other parts of the site were taken over by the 48th Maintenance Unit to repair and rebuild Halifax bombers of No. 4 Group Bomber Command. The repair depot was first opened close to Rawcliffe village in July 1941, and comprised six hangars operated by Hadley Page Ltd (Abraham 2005, 69). The complete overhaul of a Halifax could be achieved in eight weeks compared to the 25 needed at an operational base, and between 3,000 and 4,000 were employed at the works, mostly women (Thompson 1994). Demand for the repair work meant that additional facilities were constructed by September 1942 as a Civilian Repair Unit (also known locally as 'The Yard') on Water Lane, with a total of nine hangars; some 2,700 people were employed in these works (Abraham *nd*; *www.militaryhistories.co.uk/york/target_york*). A spares depot was also built on Water Lane. More than 2,000 Halifax bombers were repaired during the war, and mobile teams were sent out from the airfield to repair bombers at other locations.

In order to accommodate the heavier aircraft, three concrete paved runways and 14 hangars, including one Type T1 and 12 Blister hangars, were constructed, as well as accommodation for 500 personnel. The three runways formed a triangle shape, the longest (07/25), aligned north-east/south-west, being 4,800ft long and the other two (13/31 and 17/35) being 600ft shorter. The control tower and a technical site were built close to Green Lane, and the domestic sites, sick quarters etc were built in a dispersed manner stretching from Water Lane eastwards towards Bootham Stray.

An aerial photograph taken in 1942 shows the airfield to be well developed (*www.cliftonwithout-pc.org.uk/CliftonWithout/history-14894.aspx*), and the site is also clearly visible on the vertical aerial photograph dated 3rd June 1942 (YCA HMU/L/22/17; (Wenkel, Lang & Sainsbury 2018, 14). At the latter date, the runways were not as extensive as they were subsequently shown to be in 1945 (see below), and it had previously been assumed that the runways were extended after June 1943 when the airfield was transferred to RAF Fighter Command (BHA 2019, 14). However, an Air Ministry Works Directorate (AMWD) landing ground camouflage plan dated October 1942 (ERAO DDX 598/2; see below) does show the extended runways, and so they must have been extended between June and October 1942. This expansion may well have been associated with the introduction of single-seater fighter airplanes to the site.

The airfield was bombed and damaged during the York 'Baedeker' raid of 28th-29th April 1942. This was the most significant bombing raid to hit the city during the war, involving over 60 bomber aircraft of three types, with more than 95 tons of high explosive and incendiary bombs dropped across the city. The bombing was mainly concentrated in the vicinity of York railway station, some 3.7km south of Clifton airfield, causing significant damage including the destruction of 579 houses (Wenkel, Lang & Sainsbury 2018, 11). At the Clifton airfield, it is reported that the guardroom received a direct hit, with some hangars and the officers' mess being wrecked from blast damage (YCA HMU/14/20), and some bombs also fell on the landing area (Wenkel, Lang & Sainsbury 2018, 13-14). The June 1942 aerial photograph shows at least nine possible bomb craters on or around the airfield (Wenkel, Lang

& Sainsbury 2018, 14). Two copy slides of black and white photographic images belonging to the City Engineers Department appear to show the airfield after the raid - one shows a large bomb crater on the ground, whilst the other is a copy of the aerial photograph noted above (YCA HMU/L/22/17).

Between June and December 1942, the airfield was used by No. 169 Squadron RAF with Mustang I fighters as a detachment from RAF Doncaster; this was a tactical reconnaissance and later a night intruder squadron. The 4th Army Co-operation Squadron also continued to use the airfield, and several other Army Co-operation squadrons came and went, including 809 Squadron of the Fleet Air Arm which was present from December 1942 until April 1943. In 1943, nine Halifax bombers were destroyed after a spark ignited a petrol supply and three hangars were burnt out (YCA HMU/14/20), and there are records of other crashes at the site (Wenkel, Lang & Sainsbury 2018, 24).

Plans were drawn up in October 1942 by AMWD to camouflage the airfield, along with several others in East and North Yorkshire (Simmons 2004). This was to be achieved by ploughing and harrowing the ground between runways, and spreading coloured powders to simulate growing and harvested crops, and using a combination of cement and sulphuric acid to producing 'dark areas' to mimic ploughed fields. Other measures included the creation of dummy hedges using brushwood, with painted continuations across runways to simulate field systems, the creation of dummy roads usually connecting with local roads and lanes, and painting large black patches to break up runway alignments. Attempts were also made to spread runways with wood chippings, and taxi-ways with a combination of bitumen and sand, so as to disguise concrete panels and other surfaces which were particularly visible when wet. The roofs of large hangars and other structures at the technical sites were also similarly covered (Simmons 2004). The plan for the Clifton airfield survives (ERAO DDX 589/2) (see figure 8). This shows that most of the grassed areas between the runways were to be given over to cultivation, and an application of sulphuric acid was carried out in July 1943. Two 'black areas' were to be created, as well as two dummy roads right across the airfield, one running north-south and the other east-west, and several hedgerows to recreate the former field system. Cross-hatching along No. 5 runway suggests that this was treated with wood chippings, if the key to other airfields can be compared. It is not known how many of the recommended camouflage measures were carried out.

Between June 1943 and May 1945, the airfield was operated by RAF Fighter Command, although the 48th Maintenance Unit also remained at the site. Later maps show 15 fighter-type open-air dispersal pens around the perimeter taxi-way on the north and east side of the airfield, and it is presumed that they were built for the American or RAF fighters. Various Air Observer Post squadrons also used the airfield, specifically 657 Squadron, then 658 and 659 Squadrons, all equipped with Auster Aircraft. By June 1944, the site had become the base of No 4 Aircraft Delivery Flight (ADF) under No 12 Group, using Dominie and Oxford aircraft, whilst in the same year No 430 Squadron of the Royal Canadian Air Force (RCAF), flying Mustang bombers, were present; they took part in parachute drop and glider-towing exercises codenamed 'Eagle' (Wenkel, Lang & Sainsbury 2018, 22). In December 1944 the station strength comprised 503 personnel, of whom 119 were members of the WAAF.

An Air Ministry Record Site Plan made in November 1945 (YCA Y/ORD/4/6/52) shows the airfield in great detail, and includes a numbered key which identifies the different structures, buildings and areas shown (see figure 9). The three intersecting runways are clearly visible, with the domestic camps, including the mess site, the WAAF site and the sick quarters concentrated around the southern edge of the airfield on Water Lane. The Ministry of Aircraft Production (MAP) sites are shown at the end of Rawcliffe Lane, and off the north side of Water Lane. To the east, west and north sides of the runways, aircraft dispersal pens and Blister hangars are laid out in groups. An isolated group of structures marked as 'Danger Buildings' to the north of the airfield are almost certainly a bomb or munitions

storage area, whilst the map also includes an inset depicting the WT Transmitting Site. To the north, an isolated Robin hangar in a field on the edge of Skelton Plantation, well north of the airfield proper and accessed by an extension to Moor Lane, was where the aircraft Smoke Curtain Installations would have been maintained and charged with mustard gas to be used against invading enemy troops (Airfield Research Group forum, entry by 'Carnaby', posted 8th September 2011). There is also at least one surviving photograph taken at ground level of the buildings (including the control tower) in c.1945 (*www.controltowers.co.uk/C/Clifton.htm*), and an aerial photograph of the airfield taken on 15th April 1946 (Wenkel, Lang & Sainsbury 2018, 16).

After the war, between 1945 and 1948, the site was used by the 48th Maintenance Unit to dismantle over half of the remaining national Halifax bomber fleet, and hundreds of aircraft were stored at the site; at one point, a huge pile of scrap metal about 80 feet high had accumulated close to Rawcliffe village. The RAF left in 1946 but the site was not decommissioned, and was still used by Yorkshire Aviation Services for a short period. The airfield then returned to civilian use, and a 1950s map by R S Bellhouse, the City Engineer, and based on the 1945 Air Ministry plan, has a dashed line showing the extent of the civilian airfield, which appears to have occupied the south-west part of the former military airfield (YCA HMU/14/20). An aerial photograph dating to 1951 shows the north-west corner of the airfield, with the Ministry of Aircraft Production site off Rawcliffe Lane still largely intact (see figure 10) (Airfield Research Group forum, entry by Peter Kirk, posted 6th December 2018). The airfield officially closed in 1952.

The extent of the surviving wartime structures and other features are shown on the Ordnance Survey maps dating to 1958 (see figure 11). York City Archives also contain photographs of surviving airfield buildings at this time (e.g. YCA HMU/L/22/18; YCA Y/PPT/1/2/60). The layout of the airfield, including the three runways, numerous dispersal pens and other associated features, still survived to be shown in some detail in 1967-69 (see figure 12); the 25" editions are especially useful in that they show considerable detail.

Most of the airfield infrastructure was destroyed in the 1980s when it was built over to provide housing and the Clifton Moor Retail Park. An aerial photograph taken during this redevelopment is available on several websites (e.g. *www.cliftonwithout-pc.org.uk/CliftonWithout/history-14894.aspx*). Some the hangars to the south of the retail park survived as late as 2009, being used for grain storage, but were then demolished after archaeological recording (*www.forgottenairfields.com/airfield-clifton-977.html*; YCA HMU/P/9/61-70; Robinson 2008). In 1989 it was said that a World War Two guard room was still serving as a scout hut adjacent to the former main entrance to the airfield off Rawcliffe Lane (YCA HMU/14/20), but it is not known if this still survives. There are also reputed to be foundations and other remains of structures in woodland off Water Lane and Woodland Chase, belonging to the former mess site and accommodation site No. 1. Other sections of the perimeter taxi-way were destroyed or built over in 2007. There is also an airfield memorial at the junction of Clifton Moorgate and Kettlestring Lane, dedicated to the memory of RAF and Handley Page personnel and original members of Yorkshire Aviation Services who operated the airfield between 1936 and 1939. However, some important survivals on the south side of the A1237 include a short section of the eastern threshold of runway no. 1, an associated perimeter taxi-way and a single earthwork fighter dispersal pen close to the Wigginton Road; this site was included in a recent archaeological desk-based assessment, and was noted to be in an excellent condition, including the internal pre-cast concrete crew shelter (Bruce 2015).

Today, apart from the structures and areas recorded as part of this current report, little of the airfield survives on the north side of the A1237, apart from an isolated structure or two, for example near Ings House and possibly in Moor Plantation.

5 DESCRIPTION OF THE SURVEYED SITES

The features forming the focus of this report were previously described in outline as part of the Cultural Heritage: Simple Assessment Report prepared in June 2019 (BHA 2019, 21-27). However, the more detailed survey work described below has significantly enhanced the understanding and appreciation of the sites. In the following text, photographs are referenced in square brackets and italic type according to film and image numbers, e.g. [*2/045*].

The Runways and Associated Features

Background Information

General details relating to the origins and development of the runways, as part of the history of the airfield as a whole, have been covered above.

The majority of the surviving part of the airfield comprises the northern ends or thresholds of the two shorter runways (Nos 5 and 6 as labelled on the 1945 Air Ministry plan; see figure 9), together with parts of their associated perimeter taxi-ways. As stated previously, these northern ends of both runways are not shown on the June 1942 aerial photograph, but they are depicted on the October 1942 camouflage plan (ERAO DDX 589/2), suggesting they were built between these dates, expanding the triangular layout of three runways originally laid out for bombers in 1941.

All the runways and perimeter taxi-ways at Clifton are of sectional concrete construction covered with a thin layer of bitumen; where the edges can be seen, the concrete panels have an average thickness of 0.10m. Prior to clearance, much of the surface was badly overgrown with bushes, small trees and moss (see plates 1 and 2). The runways and taxi-ways are clearly visible on the various Ordnance Survey maps and the 1951 aerial photograph (see figures 10 to 12).

Site Description (see Figures 13 and 14)

<u>Western Taxi-way</u>

Described from west to east, the western perimeter taxi-way is aligned north-west/south-east, with a surviving length and width of c.100m and 11m respectively; the southern end survives no further south than the branch leading to the former bulk petrol installation (see below). The surface of the taxi-way is set at an average height of c.13.00m AOD. The perimeter taxi-way is of sectional construction using two parallel lines of concrete panels, some of which retain traces of their bitumen covering [*3/495, 3/496*]; the average size of the rectangular concrete panels is 8.40m by 5.50m (see figure 13).

Approximately half way along the surviving length of the taxi-way, there are former light positions, a single light to the west side [*3/494*] and a double light to the east side [*3/488, 3/489*] (see plate 3). These were excavated, cleaned and recorded as part of the survey work, and are typical of the former light positions surviving to taxi-ways across the survey area. Each single light position is formed by a concrete panel 0.32m square, set within a less regular concrete surround (see figure 14) [*3/492, 3/493*] (see plate 4). In the centre of each panel, there is a recessed circle 0.22m diameter and 20mm deep, with three projecting metal pins set around the edges, each 10mm in diameter. In the centre of the base of each circle, there is a hole, 0.10m square with a small projection to one edge, which passes through the full depth of the concrete panel. The double light is essentially two single lights of the same design placed side by side [*3/487, 3/490, 3/491*] (see plate 5). The light fittings themselves have

been removed, but comparison with surviving examples at other airfields show that they were most likely to be of the T1 type, although there were several variations.

Where the taxi-way curves around to the north to meet the northern threshold of the western runway (no. 5), it gradually increases in width, reaching a maximum width of 35m. Here, the taxi-way makes use of curving, angular and rectangular concrete sections. The surface of the concrete panels is badly worn in this area, and there appear to be a number of repairs taking the form of angled or linear sections of concrete which have been inserted into the more regular rectangular panels [*3/499, 3/500*]. This area is also crossed by a short post and wire fence of more recent date.

Western Runway (n. 5)

The western runway (no. 5) is set on a north-west/south-east alignment, with a surviving length and width of c.90m and c.45.50m respectively; there are almost certainly further remains to the south but these are now obscured by post-war dumping [*3/510, 3/511*] (see figure 13). The surface of the runway is set at an average height of 13.20m AOD. The runway is of sectional construction using nine parallel lines of concrete panels, some of which retain traces of their bitumen covering. The average size of the rectangular concrete panels is 9.50m by 5.00m [*3/505, 3/507, 3/508, 3/516*] (see plate 6). However, where joints can be discerned, there are also much shorter panels used and, in at least one instance, what appears to be a narrow line of concrete runs across three lines of panels [*3/515*] (see plate 7); this might have been a repair or for cabling. Apart from the thin bitumen covering, there are no obvious remains of any other camouflage material, such as the wood chippings mentioned in Chapter 4 above.

A culvert or drain runs parallel to the north-east side of the runway, and this is typical of others seen at other 2WW airfields. The position of the underground drain is marked by three brick inspection chambers, set at 14m to 16m centres. Each chamber is rectangular in plan, measuring 0.95m by 0.38m, and is built of orange machine-made bricks; the height from the top of the chamber to the base of the culvert or drain is c.0.65m [*3/514*]. Two of the chambers retain a cast-iron grille cover, bearing the cast mark 'DUDLEY & DOWELL LTD CRADLEY HEATH STAFFS PATENT NO. 24761/39' [*3/512, 3/513*] (see plate 8); the same company supplied the drain cover at the bulk petrol installation (see below).

At the northern end of the runway, adjacent to the boundary fence, there is a large, *ex situ*, cylindrical metal tank [*3/501-3/503*] (see plate 9). The tank measures c.4.5m long by c.2m in diameter, and appears to be a fairly conventional liquid storage tank with a capacity of c.3,000 gallons. It sits on two curving cradles with flat bottoms which have been welded to it, and it has seven flanged pipes projecting from the upper surface; these seem to be organised into three pairs, with a significantly larger inlet pipe. There also appears to be a flanged outlet to the base. On its western end, the tank bears a small stamped metal plate [*3/504*]. From top to bottom, the plate reads 'W7543' between the letters 'JTD', then 'B/T/8134/B', then 'ITEM T 586', then 'H T VESSEL 75 LBS', then 'H T COIL 700 LBS' - it also appears to be dated '17-5-57'. In this context, 'HT' generally means 'high temperature', and may indicate that the tank stored something that was kept warm to avoid partial solidification in cold weather, such as heavy diesel or petrol oil, perhaps for a boiler (Richard Lamb, *pers. comm.*). Although the tank is similar to other examples seen at other RAF airfields, it was subsequently confirmed that it had been brought to the site in the 1990s to store liquid fertiliser (Mr Ben Cleminson, landowner, *pers. comm.*).

Central Taxiway

The central perimeter taxi-way, running between the northern ends of the two runways, is aligned north-east/south-west, with a surviving length and width of c.236m and 11m respectively; at either end, where the taxi-way meets the runways, it increases to a maximum width of 35m to the western runway but 50m to the eastern runway (see figure 13). The surface of the taxi-way appears to slope very slightly upwards from south-west to north-east, rising from an average height of 13.00m AOD to 13.15m AOD. The main body of the perimeter taxi-way is of sectional construction using two parallel lines of concrete panels, some of which retain traces of their bitumen covering; the average size of the rectangular concrete panels is 9.50m by 5.50m [*3/521, 3/522, 3/531, 3/533*] (see plate 10). At either end where it meets the runways, the taxi-way makes use of curving, angular and rectangular concrete sections [*3/517, 3/518, 3/537, 3/538*].

There are former light positions placed on either side of the taxi-way, at regular centres of c.65m. Described from west to east, there is a pair of lights, formed by a single light to the north side and a double light to the south side [*3/523*]. There is then a single light placed on the south side, with apparently no corresponding light to the north side, although this might have been lost through later disturbance or decay. Finally, there is another pair of lights, again formed by a single light to the north side and a double light to the south side, towards the north-east end. All the lights are of the same form as those examples excavated and recorded in detail (see above). In addition, at the east end of the north side of the taxi-way, there is a concrete block or cube, measuring c.0.45m in all directions (see figure 14). The cube has a 75mm square recess in the centre of the top surface. The recess is 30mm deep, and has a metal tube 30mm in diameter placed in the centre of the base [*3/534, 3/535*] (see plate 11). The cube is placed off centre to two gate posts in the fence line on the north side of the taxi-way, but appears to be *in situ* here, so the gateposts may be a coincidence [*3/526*]. If so, its former function is unknown, but the tube presumably held an electrical cable, and so it may have been the base of another kind of light. Towards the east end of the south side of the taxi-way, there is a single drain cover in line with the easternmost pair of lights. The drain cover is 0.58m square with a cast-iron frame [*3/528, 3/529*] (see plate 12).

The boundary fence along the north edge of the taxi-way retains barbed wire, wooden posts and angle-iron posts; the latter may date from the Second World War [*3/524*]. In addition, when this area was being cleared of vegetation, the excavator turned up several examples of ceramic cable markers, bearing the impressed wording 'DANGER ELECTRIC CABLES' [*3/525*]. It is assumed that these date from the Second World War, and were used to mark the route of the electricity supply to the taxi-way lights.

Eastern Runway (no. 6)

The eastern runway (no. 6) is set on a shallow north-north-west/south-south-east alignment, with a surviving length and width of c.230m and 45.50m respectively (see figure 13). The surface of the runway is set at an average height of 13.30m, and is slightly higher to the centre than the edges, presumably to shed water. This section of runway, as far as the junction with runway no. 5, is visible on an aerial photograph taken on 15th April 1946 (Wenkel, Lang & Sainsbury 2018, 16).

The runway is of sectional construction using nine parallel lines of concrete panels, some of which retain traces of their bitumen covering. The average size of the rectangular concrete panels is 9.50m by 5.00m [*3/544, 3/546, 3/548-3/553, 3/556*] (see plate 13). However, where joints can be discerned, there are also much shorter panels used and in at least one instance, what appears to be a narrow line of concrete repair runs across three lines of panels [*3/539*]. Towards the north end of the central row

of panels, one has a marking made when before the concrete had set, apparently comprising the numerals '14/45' [*3/543*]. There was at least one other possible example of the same numerals towards the south end of the runway, and perhaps others, but these were very worn and less convincing.

At regular centres of c.55m, there are former light positions placed in pairs on either side of the runway. Unlike the taxi-way lights, which are set into the edges of the taxi-ways themselves, the runway lights are placed slightly beyond, but immediately adjacent to, the runway [*3/541*] (see plate 14). A typical example was excavated, cleaned and recorded (see figure 14). Each light position is formed by a rectangular concrete panel, measuring 0.61m by 0.38m; the top of the panel was flush with the surface of the runway [*3/540*]. In the centre of each panel, there is a recessed rectangle with rounded corners, 25mm deep, with four projecting metal pins set around the edges, each 10mm in diameter. In the centre of the base of each recessed rectangle, there is a hole of the same shape, which passes through the full depth of the concrete panel. Where one of the lights had been disturbed, it was observed that the concrete panel was in fact only the visible part of a pre-cast block. The upper part of the block was 80mm deep, chamfered to the underside and had once been raised 0.20m above the surrounding ground level. The lower part of the block formed the foundation and was roughly cast; the whole structure had a depth of 0.34m [*3/555*]. The light fittings themselves had been removed, but comparison with surviving examples at other airfields shows that they were most likely to be of the C6 type runway marker lights.

As with the other section of recorded runway, a culvert or drain runs parallel to the both sides of the eastern runway. The position of the underground drain is marked by brick inspection chambers, four to the west side and two to the east side; the surviving examples to the west side are spaced at c.30m centres. In form and construction, they are as described for the western runway [*3/542*] (see plate 15).

<u>Eastern Taxi-Way</u>

The eastern perimeter taxi-way is aligned north-north-west/south-south-east, with a surviving length and width of c.230m and 11m respectively (see figure 13). Where the taxi-way curves to meet the eastern runway, it gradually increases in width, reaching a maximum width of 35m, making use of curving, angular and rectangular concrete sections [*3/558, 3/560*]. The surface of the taxi-way is set at an average height of 13.50m AOD. The main body of the taxi-way is of sectional construction using two parallel lines of concrete panels, some of which retain traces of their bitumen covering; the average size of the rectangular concrete panels is 9.20m by 5.50m [*2/472; 3/563, 3/564*] (see plate 16). There are drain covers set along both the east and west sides of the taxi-way; the surviving examples suggest that they were laid out in pairs opposite one another. Each drain cover is 0.58m square with a cast-iron frame.

Approximately half way along the surviving length of the taxi-way, there is a single light to each side. Towards the north end of the taxi-way, where it begins to curve towards the northern threshold of the eastern runway, there is another pair of lights, with a single light to the east side and a double light to the west side. They are of the same form as described previously to the other taxi-ways [*3/561*], although the double-light example here retains its original wiring which passes up through the central square hole of the recessed circle; the wiring consists of three flexes, twisted together [*3/562*]. It was also noted that along the centre line of the taxi-way, there are at least four small areas of repair, quarter-circle or semi-circular in plan, either at the corner of one panel or where two panels meet [*2/475*]. It is possible that these represent the position of former fittings (perhaps lights?) which

were removed and the surface repaired, although they may be no more than damage to the concrete panels at weak points such as the corners.

Surrounding Areas

The triangular area between the runways and taxi-ways is now occupied by recently planted woodland, some of which has been planted using a 'ripping' technique which has resulted in significant rutting to the ground surface. However, the 1945 Air Ministry plan and the 1951 aerial photograph (see figures 9 and 10), amongst other sources, suggest there were no buildings or other structures placed here.

A wooded area, located between the eastern taxi-way and Moor Lane, and later named as Poplar Plantation, appears on the 1942 camouflage plan and the 1945 airfield plan, the 1946 aerial photographs, and later Ordnance Survey maps (see figures 8, 9, 11 and 12) . It was not present in 1893 however, and in 1854, it formed part of the south-east boundary of 'The Brecks', lying within Skelton township. The Brecks formed one of the five open fields of Skelton village, and Moor Lane has a spread bank, c.3m wide and 1m high, running parallel to its west side, with a shallow ditch to the west side of the bank, inside the plantation (BHA 2019, 16). Although this bank and ditch could have been established later, it is quite possible that they represent the remains of a medieval boundary. The gap between the south end of the wood and the A1237 ring road is now included within the modern plantation and this southern area has been identified as a possible location for an aircraft breaking area, used both during the war and in the immediate post-war period; it appears on an aerial photograph taken 10th May 1946 as a disturbed area of ground (Wenkel, Lang & Sainsbury 2018, 31-32). The plantation was not inspected further as part of the current survey work.

On the Ordnance Survey maps of 1967-69 (see figure 12), an irregularly-shaped raised earthwork is shown in the northern part of Poplar Plantation, with a single small square structure to its south-west, on the north side of a track linking these features to the eastern perimeter taxi-way described above. The irregularly-shaped area survives today as a significant flat-topped mound, from which a considerable amount of debris is either eroding or being brought up by rabbit burrowing. Some of this is clearly post-war dumping, although some of the pottery fragments bear 'NAAFI 1946' markings on the base suggesting that there is also wartime and immediate post-war material here; an aerial photograph taken 10th May 1946 (Wenkel, Lang & Sainsbury 2018, 31-32) appears to show recently disturbed ground or dumping here. It seems likely that the mound was partly formed by clearance of on-site airfield structures or dumping that had started by 1946, and which may have continued until at least 1967-69. Nevertheless, there may once have been wartime structures in this area, represented by shallow earthworks to the west of the mound, although nothing is shown in this area on the 1945 airfield plan (see figure 9).

The only clearly surviving structure in this area is that shown in 1967-69. It is represented on the ground by a rectangular ruin, aligned north-west/south-east, measuring 5.40m long by 4.10m wide (see figure 14) [*3/565, 3/566*] (see plate 17). The structure is built of red machine-made bricks laid in a variation of English Garden Wall bond (three stretcher courses to each header course) set with cement mortar; some of the bricks are frogged, with the impressed mark 'Yorkshire Br...'. There may be a doorway or other opening to the centre of the south-west wall. A metal fitting of unknown purpose projects from one corner of the building. It is represented by a tube, c.1m long, now curving over towards the top, with a series of integral semi-circular loops to one side [*3/567*]. There is at least one *ex situ* example within the building itself. All the surviving external walls have a covering of cement render. The structure could possibly be the same one illustrated in a photograph taken in 1988, although no function or description is given (*www.controltowers.co.uk/C/Clifton.htm*). At this

date, it was of a tall two storeys, with a flat concrete roof. There were large openings at ground floor level and towards the top of the visible side. The entire exterior had once been covered in grey cement render. As the structure does not appear on the 1945 airfield plan, it is presumably of post-war date.

The Bulk Petrol Installation

Historical Background

As has already been noted above, the northern extent of both runways is not shown on the June 1942 vertical aerial photograph and neither is the bulk petrol installation (YCA HMU/L/22/17). It is also not depicted on the October 1942 camouflage plan (see figure 10), although this may be an attempt to simplify the drawing. However, it is shown on the 1945 airfield plan, numbered as '25b', and described as a 'Bulk Petrol Installation (24,000 gallons)' (see figure 3A); other similar installation is shown on the eastern side of the airfield (25a'). The western site is depicted on this plan as an elliptical roadway, linked to one of the perimeter taxi-ways used to move planes and equipment around the airfield; there are two Blister hangars and an aircraft dispersal pen close by to the south. The roadway has a single rectangular structure marked on its north side, and two similar parallel structures on its south side. The roadway is clearly visible on an aerial photograph taken 10th May 1946 (Wenkel, Lang & Sainsbury 2018, 31). More detail on the probable wartime form of the site is provided by the standard Air Ministry design for a 24,000 gallon aviation petrol installation dating to October 1940 (Air Ministry 15425/40; see figure 15).

The site is clearly shown on the 1951 aerial photograph (see figure 10). On the 1967-69 Ordnance Survey map (see figure 3B), the site is depicted as being surrounded by an elliptical concrete roadway, itself linked to one of the perimeter taxi-ways. Within the area enclosed by the concrete roadway, there are short linear north-west/south-east aligned mounds at the east and west sides, reinforced by walls. Between the mounds, there are two small rectangular structures. The site escaped the extensive re-development of the rest of the airfield which took place during the 1980s, but was itself subsequently partially demolished at some point between 1988 and 2002. Fortunately, a number of photographs were taken in 1988 prior to this demolition, although these erroneously identify the site as gun butts (*www.controltowers.co.uk/C/Clifton.htm*; see figure 3C). They show that each of the linear mounds was open to the concrete roadway and incorporated a substantial brick wall to the other three sides. The walls appear to have been capped with concrete slabs. Each wall had a flight of nine or ten concrete steps rising to the top of the south end, whilst a small square brick structure projected above the north end; these may possibly have had vents or openings to their south sides. Between the mounds, the two small rectangular structures marked in 1967-69 can be seen. They were both brick-built, of a single storey, with flat concrete roofs - the southern structure had an entrance in the east elevation flanked by a screen wall, and the 1967-69 map shows the other was of the same plan. To the south of the south structure, there is a tall metal stand post. The contrast between the appearance of the linear mounds in 1988 and their existing appearance demonstrates that there was some infilling to the open (roadway) sides when the demolition took place. Despite the demolition works, the site remains clearly visible on pre-2015 modern colour vertical aerial photography (see figure 3D).

Site Description (see Figures 16 and 17)

As previously mentioned above, the site was subject to a detailed measured earthwork survey in late February/early March 2019 after vegetation clearance (BHA 2019, 23-27; see figure 4), and that description is incorporated into the following text for completeness. Additional clearance and partial

re-survey took place during the current phase of works. Within and around the site, the ground surface is generally set at 13.20m.

The former bulk petrol installation comprises several different elements. It is surrounded by an elliptical concrete roadway, of sectional construction using reinforced concrete panels; the surface of the roadway is set an average height of 13.25m AOD. The complex has maximum dimensions of 39.5m east-west by 39.5m north-south, but the roadway is not the same width all the way round - on the centre of the east and west sides it is only 3.0m wide, but increases to 6.0m wide to the centre of the north side and 9.00m to the south side. The additional width of the south side of the roadway provided room for the RAF tankers to park then, after being filled up with aviation fuel, they would have then have been driven out to the aircraft that were dispersed around the airfield. Where the edges are visible, the concrete panels are on average 0.10m thick. They do not appear to have a uniform size or shape, although it is sometimes difficult to distinguish between original joints and later, regular, cracks; the largest visible panels, placed at the centre of the south side of the roadway, measure 9.0m by 4.5m. Some of the panels around the roadway retain traces of their original bitumen coating. To the external south-west side of the roadway, there is a shallow ditch with a more prominent outer bank. It was initially thought that this was likely to be a modern feature, but a similar earthwork to the south of the adjacent taxi-way finished abruptly at the boundary fence of the A1237, suggesting that it might in fact be related to wartime activity. The section of roadway connecting the bulk petrol installation to the adjacent taxi-way to the east was only partly visible at the time of the initial survey. The taxi-way itself has already been described above under the main runways.

The elliptical concrete roadway encloses two mounds ('A' and 'B') and an area of rubble between which contains the remains of two ruined structures. The west mound ('A') measures 20m north-south by 9.50m east-west, and stands to a maximum height of 1.35m (see plate 18). It has a flattened top, and is generally more steeply scarped to the east side than to the other three sides; comparison with the 1988 photographs (see figure 3C) demonstrates that much of the west scarp was created after this date. The brick wall visible in 1988 partly survives, but has clearly been very substantially truncated since that date. This brick wall has a maximum surviving north-south length of 11.0m, returning to the west for a maximum of 4.10m at either end. It has an average surviving width of 0.36m but now survives to a maximum visible height of only 0.55m. The wall is built from orange-brown machine-made bricks (average dimensions 230mm by 120mm by 80mm) laid in an approximate English bond (alternating stretcher and header courses) and set with a cement mortar. At the north end, the small square structure shown here in 1988 is built of the same brickwork and is tied into the main wall; it measures 0.74m square internally and is at least 1.00m deep, with all internal faces being rendered.

The east mound ('B') measures 19.0m north-south by 11.50m east-west, and stands to a maximum height of 1.35m. It has a gently rounded top, and is generally less steeply scarped to all four sides than the west mound; again, it is likely that much of the east scarp was created after 1988. The brick wall visible in 1988 partly survives, but has clearly been very substantially truncated since that date. This brick wall has a maximum surviving north-south length of 11.0m, returning to the east for a maximum of 4.5m at the north end; the latter appears to represent the original full extent. It has an average surviving width of 0.36m but now survives to a maximum visible height of only 0.50m; the wall is built of the same brickwork as that described within the west mound. At the north end, there was once a square structure again as described for the west mound but it has been largely destroyed, leaving two stub walls; it retains no traces of any internal render. A length of steel cable projects from the surface of the mound close to the remains of the wall at the south end, whilst to the south of the wall itself a small section of concrete remains *in situ*.

At the time of the initial survey work, the area between the two mounds was occupied by a spread of demolition rubble, originating from both the mounds and the pump houses. The majority of this demolition rubble comprised similar brickwork to that already described above, although some appeared to have a thin layer of pieces of blue slate affixed to a render. Within the rubble, at least two *ex situ* sections of the concrete steps which formerly rose up the southern end of both mounds survive, as well as a bolted angle-iron frame, perhaps originally a drain or tank cover, divided into three sub-square parts of equal size, each fitted with a metal panel. The remains of the two pump houses are described in more detail below.

Excavation and Clearance

As set out in Chapter 3 above, two evaluation trenches were excavated on the site, across the centres of the two linear mounds formerly housing the petrol tanks, whilst loose rubble and concrete was cleared from on and around the two pump houses (see figure 16). All works were undertaken using a 360 degree tracked excavator with a toothless ditching blade, and then cleaned by hand. Prior to the works starting, the site had again become overgrown [*1/405-1/407*].

Trench 1

Trench 1 through the west mound ('A') was aligned broadly east-west. It measured a maximum of 12.25m long by up to 4.30m wide; the east end was considerably narrower. The trench was excavated to a maximum depth of 1.90m below the top of the mound (c.12.75m AOD), which placed it some 0.50m lower than the surface of the concrete roadway surrounding the installation, which was set at an average height of 13.25m AOD. The deposits exposed in both sections of the trench were very similar and, for the purposes of description, the south-facing section (i.e. the north side) is described below (see figure 17).

Starting at the east end, immediately beyond the trench, what had previously been thought to be *ex situ* concrete from the demolished pump houses was revealed to actually form the remains of a sloping concrete skirt placed around the bottom of the eastern scarp of the mound. This skirt was 1.60m wide, 0.70m high and extended for at least 2.00m to the north of the trench; it was not clearly visible to the south [*1/447*]. Within the trench, the uppermost deposit (001) was a black/dark brown sandy silt topsoil, extending to an average depth of 0.50m below ground level (BGL) (c.14.15m AOD). The topsoil overlay a mid to dark-brown sandy silt (002), containing a higher proportion of sand than the topsoil itself. The sandy silt had a level base, set at c.13.05m AOD. It overlay a horizontal deposit of compacted black silty sand (003) which smelled strongly of oil/petrol; it continued below the base of the trench (c.12.75m AOD) [*1/427*]. The same deposits were noted in the north-facing section [*1/428*].

All three of these deposits represent the original, undisturbed construction of the mound, and butted the east wall of the north-south brick chamber formerly housing the petrol tank. This wall was built of the same brickwork as already described above, and had an average width of 0.36m; the east face was rendered to its full surviving height [*1/424-1/426*] (see plate 19). Although the wall had been truncated during the demolition works undertaken between 1988 and 2002, it was visible in both sections rising through the full height of the mound [*1/429*]. The main body of the chamber measured 10.25m long by 3.50m wide internally.

The north end of the chamber was fully excavated, revealing that it had a concrete floor, set at c.12.75m AOD (see figure 17). On the north, east and west sides, the chamber's brick walls were rendered to 0.45m above the level of the internal floor, with bare brickwork above this [*1/437, 1/438; 2/458, 2/459*]. The north wall survived to a maximum height of 2.05m above the concrete floor

[*1/433, 1/436; 2/460*], but the west wall was much lower, having been truncated during the 1988-2002 demolition works [*1/431, 1/432*]. The tank itself had been supported on a series of low brick piers with curving upper surfaces. One was positioned at the base of the north wall of the chamber, with further paired examples running the length of the concrete floor. The paired examples alternated with pairs of anchor points, each comprising three U-shaped links [*1/434, 1/435, 1/441*] (see plate 20). The anchor points were used to secure the ends of steel cables which ran across the top of the petrol tank, helping to hold it in place; in some cases, a length of the steel cable itself was still attached [*1/439, 1/440; 2/462*] (see figure 17 and plate 21). A small plank and batten door at the north-east corner of the chamber's concrete floor proved to be *ex situ*.

The main body of the chamber was backfilled with a very mixed deposit of mid to dark-brown sandy silt (004). This had been put in place after the 1988-2002 demolition works, which had evidently broken into the chamber from the west side. In the upper part of this fill, there were a number of *ex situ* section of cast-iron pipes which, it is assumed, were once used to put petrol into the tank [*1/430*] (see plate 22). The pipes comprised two different sections. The straight sections were 1.16m long, with an internal diameter of 90mm, flanged to one end and threaded to the other. The threaded end sometimes had a much shorter curved pipe section attached to it, turning through 90 degrees [*2/471*] (see figure 17). To the west of the former west wall of the petrol tank chamber, both sections of the mound showed it to comprise the same material (004) as had been used to backfill the chamber itself.

Trench 2

Trench 2, excavated through the east mound ('B'), was also aligned broadly east-west, and it measured a maximum of 13.0m long by 2.0m wide (see figure 16) [*1/410*]. It was excavated to a maximum depth of 1.55m below the top of the mound (c.13.00m AOD), which placed it some 0.25m lower than the surface of the concrete roadway surrounding the installation, which was set at an average height of 13.25m AOD [*1/408, 1/409*]. The deposits exposed in both sections were very similar and, for the purposes of the following description, the south-facing section is described below (see figure 17).

Starting at the east end, within the trench, the uppermost deposit (001) was a black/dark brown sandy silt topsoil, extending to a maximum depth of 0.70m BGL (c.13.85m AOD), but generally shallower. This topsoil overlay a loose, clean orange-brown sand (005), which extended beyond the base of the trench itself (c.13.00m AOD) [*1/422, 1/423*]. The sand was backfill material, put in place after the 1988-2002 demolition works, which had evidently broken into the chamber from the east side; the earthwork survey demonstrated that the scarp of the mound here was far less regular than that to the west side. The sand (005) overlay the east wall of the north-south brick chamber formerly housing the petrol tank. The wall was built of the same brickwork as already described above, and had an average width of 0.36m. The main body of the chamber measured 10.25m long by 3.50m wide internally [*1/411*] (see plate 23). Unlike the chamber within the west mound, the floor and internal structure were not exposed, and these elements did not survive to the same degree as the west mound. However, two parallel lines of brick were noted in plan only adjacent to the west (internal) face of the east wall. It is probable that these were the remains of a support for the base of the petrol tank, as described above in the west mound [*1/417*]. The west wall of the brick chamber was truncated during the excavation of the trench, but it was visible in both sections rising through the full height of the mound [*1/415, 1/416, 1/421*]; that part of the walling within the trench was rendered to both faces [*1/412, 1/413*].

Beyond the west wall, the majority of the west slope of the mound comprised a mid to dark-brown sandy silt (006), containing a higher proportion of sand than seen in the topsoil (001). The sandy silt had a level base, set at c.13.25m AOD. It overlay a horizontal deposit of compacted dark brown silty

sand (007) which smelled strongly of oil/petrol; it continued below the base of the trench (c.12.10m AOD). The same deposits were noted in the north-facing section [*1/418-1/420*].

North Pump House

Prior to clearance, the remains of the northern pump house were obscured by its reinforced concrete roof, which had fallen to the ground in a single piece; it measured 4.50m east-west by 2.70m north-south. The removal of this slab revealed the foundations of the building, which was formerly connected to the roadway by a 1.00m wide concrete footpath [*1/422*]. The footpath terminated at the partial remains of a blast wall, visible in plan only, which had once shielded the doorway of the pump house.

The pump house itself was a rectangular brick structure, aligned east-west, measuring 4.30m by 2.50m externally [*1/443, 1/445*] (see figure 16 and plate 24). There was a doorway in the west wall, formerly giving access to the interior, which contained two concrete bases, probably the remains of an engine bed or mounting and associated machinery [*1/444*]. The larger base is aligned east-west, measuring 1.55m east-west by 0.55m north-south. It is at least 0.10m high, with chamfered corners [*1/446*]. There are three bolts projecting from the upper surface - each bolt is 15mm in diameter and up to 130mm long, with the upper half only being threaded. The adjacent smaller base is 0.55m square, with similar bolts to three corners; the corners are again chamfered.

South Pump House

Following clearance, the southern pump house was revealed to have also been formerly connected to the roadway by a 1.00m wide concrete footpath [*1/452; 2/468*]. The footpath terminated at the remains of a blast wall, visible in plan only, which had once shielded the doorway of the pump house [*1/453, 1/455*].

The south pump house itself was a square brick structure, aligned east-west, measuring 3.80m across externally; at the north-east corner, the walls survive up to 0.50m in height [*1/448, 1/450*] (see figure 16). There was a doorway in the east wall, formerly giving access to the interior, which contained two concrete bases, probably the remains of an engine bed or mounting and associated machinery [*1/449, 1/451; 2/467*] (see plate 25). These bases were similar to those seen in the northern pump house. The larger, centrally-placed base is aligned east-west, and measures 1.55m east-west by 0.55m north-south. It is 0.30m high, with chamfered corners. There are six evenly-spaced bolts projecting from the upper surface; each bolt is 15mm in diameter and up to 130mm long, with the upper half only being threaded. The smaller base to the south is damaged, but was once c.0.50m square, again with chamfered corners. It has a bolt to each of the surviving three corners; each bolt is 15mm in diameter, threaded and 30mm long. Again, these would have supported the pump and motor unit, and the starter gear.

Some clearance was also taken around the base of the metal stand post placed between the southern pump house and the concrete roadway [*1/456, 1/457; 2/466*] (see plate 26). The delivery pipe noted above ran into a rectangular chamber containing a meter. A flexible pipe or hose left this chamber and rose up the stand post to an angled arm, and then hung down from this; the post and arm had a total height of 9 feet 9 inches (2.97m). The form of the post and hose suggests petrol was delivered into the top of the waiting RAF tanker, which parked on an adjacent section of the roadway which had been strengthened. A shallow channel ran along one side of this standing to catch any spilled petrol.

At Clifton, the stand post is formed by an I-section (steel?) stanchion, measuring 150mm by 80mm in section and standing to a total height of 4.05m, significantly taller than the height shown on the Air Ministry design [*2/464, 2/465*] (see also plate 26). At the base of the north side, there is a metal ring with an internal diameter of 0.17m set into the ground and surrounded by a fillet of concrete. The stanchion has three brackets welded to the south face, set at 0.48m, 1.21m and 3.07m above ground level respectively. Each bracket measures 150mm by 80mm, with an inverted U-section and a pair of holes 20mm in diameter to the front (south) side. These brackets must once have supported the hose rising up the stand post. An electric cable once ran up the north face of the stanchion. There were formerly five galvanised metal clips here, each held in place by a pair of small, dome-headed bolts with nuts behind, but only one clip survived at the time of the survey. The cable rises to a thin metal plate set at 1.45m above ground level; the plate was not secured to the stanchion, but has two fittings of unknown function secured to its upper surface. The plate might once have supported a control panel to govern the supply of petrol through the hose into the tanker. Metal sheathing for a cable rises a further 0.94m above the plate, terminating at a circular fitting that perhaps once housed a dial, gauge or light. At its top, the stanchion has short flanges to the north and south sides. A horizontal (steel?) arm was once bolted to these, although at the time of survey it had become partly loose. The arm is 0.70m long and angles upwards slightly at the south end, where it has a bracket welded to it; the bracket is of the same form as those to the south face of the stanchion.

To the immediate west of the stanchion, there is an opening that gave access to the underground meter tank. It is at least 0.75m deep and was filled with water at the time of the survey. The opening has a cast-iron frame surrounded by a concrete fillet, and was fitted with a cast-iron cover in two parts bearing a lattice-pattern. The frame bears the cast mark 'DUDLEY & DOWELL LTD CRADLEY HEATH STAFFS', the same as seen on the drain covers flanking the taxi-ways described above (see plate 15).

The Cannon Testing Butts

Historical Background

Unfortunately, this part of the airfield is not visible on the slide copy of the vertical aerial photograph taken in June 1942 (YCA HMU/L/22/17), and it is not known precisely when this site was built. It is not shown on the 1942 camouflage plan (see figure 8) but, as previously noted, this plan may have been simplified. It is depicted on the 1945 airfield plan, and shown as extending beyond the northern edge of the airfield. This area is divided into two parts, the eastern part (numbered '22') is identified in the key as 'M.G. (machine gun) Range (6 Point)', whilst the western part (numbered '24') is labelled as 'NFE (night fighter equipment) Store' (see figure 5A). This is actually an error, as the Night Fighter Equipment Store would more normally be located within the main part of the airfield, near the Watch Office and close to the floodlight trailer and tractor shed, and there is another number '24' on the southern edge of the airfield; this site should actually be numbered '23' which the key identifies as 'Canon Test Butt' (Roger Thomas, Conflict Archaeologist, *pers. comm*.).

The 1945 airfield plan depicts the cannon testing butts as comprising a narrow rectangular structure at the north end, aligned almost east-west, with two conjoined rectangles to the south (see figure 5A). The track to Rawcliffe Moor Farm lies along the northern side of the buildings, beyond the airfield boundary, and there is also a track along the west side of the site leading north from a taxi-way and a dispersal pit to the south. A branch runs off this from the dispersal pits to the east, ending in an apparent turning circle. The more detailed Ordnance Survey 25" map of 1967-69 shows the site to lie at the north end of a square-ended hard-standing area (more commonly called a 'T-stand'), connected by a short length of taxi-way to the airfield perimeter track to the south, along which are a number of

aircraft dispersal pens (see figure 5B). Just to the north of the 'T-stand', a linear structure is shown with an earthwork bank parallel to its southern side.

Cannon testing butts, also known as 'shooting-in butts', were used to test or harmonise machine guns or cannons while still in fighter planes, with both machine gun ammunition and cannon shells being used.

Site Description (see Figures 18 and 19)

Prior to the survey work taking place, the site was very heavily vegetated, with large parts totally obscured (see plate 27). After clearance, the structure forming the main part of the cannon butts could be seen to be aligned north-east/south-west, although in the following description they are considered to be aligned east-west. The structure has maximum external dimensions of 11.10m east-west by 4.20m north-south, and it stands up to 4.10m in height (see figures 18 and 19). It is built of light red machine-made bricks laid in English Garden Wall bond and set with a cement mortar. The main structural part of the butts comprises the rear (north) wall [*4/792*] (see plate 28). This stands over 4.0m tall and appears to survive to its full height. The north face has a chamfered inset set approximately half way up its height. At either end, the rear wall returns to the south to form the side walls; these are of very similar form and height [*4/778, 4/793*].

The upper part of the south side comprises a structure divided into five bays of equal size; each bay is 1.50m wide by 3.65m deep, and stands 2.50m in height and is floored with a concrete slab [*4/779, 4/780, 4/782, 4/783, 4/787*] (see plate 29). The ends of the walls separating the bays are rebated from 0.50m to 1.60m above ground level; each rebate has two horizontal bolts, with a single horizontal bolt projecting from the front of the wall separating the third and fourth bays from the west end [*4/784-4/786*] (see plate 30). Each wall once had three concrete blocks to the top, although these only now survive in full to the easternmost bay [*3/608; 4/789, 4/790*] (see plate 30). Each block has a small square recess to the side, into which a horizontal bolt projects. The bolts were used to secure timbers or other fittings running at this height across the top of the bays. These would have almost certainly formed part of the roof structure, as the butts would originally have been covered by a roof. The bays would originally have contained sand or perhaps gravel, into which the cannon shells would have been fired, although no evidence for any of this former material was now visible. To the immediate east of the easternmost bay, metal fittings to the wall face may once have held a flagpole in place, used to fly a flag when live firing was taking place [*3/610*]. The base of the south side of the butts is formed by a 1.50m high south-facing sand and earth scarp, which extends over 4.0m from the brickwork structure; the top of the scarp is set at 15.80m AOD.

Some 13m to the south of the butts is the north end of the square 'T-stand' area of hard-standing [*4/781, 4/794, 4/798*] (see figure 18 and plate 31). The hard-standing measures 18m square, with a surface set at 14.60m AOD. The taxi-way to the south runs to within 3m of the modern post and rail fence/hedge marking the north side of the A1237. Both taxi-way and hard-standing are of sectional construction, using parallel lines of rectangular concrete panels, some of which retain traces of their bitumen coating [*4/795*]; the average width of the panels is 4.50m, although the joints between them remained difficult to discern, even after clearance. There was no evidence for any tethering rings or similar for securing the fighter aircraft. Some 9m to the west of the hard-standing, within an area of scrub which was not cleared, there is a large drain or soakaway. The drain is sub-rectangular in plan, wider across the east end (1.70m) than the west end. It is built of light red machine-made bricks and is over 1m in depth [*3/618, 3/619*]. There is a concrete slab laid across the west end, with a modern trench excavated for c.3m to the east. The size and form of the drain suggests that it may belong to the Second World War use of the airfield.

To the immediate east of the butts, there is a north-east/south-west aligned earth bank, running as far as the machine gun range to the east (see figure 18). The bank is c.26m long, 6m wide and up to 1.5m high; it has steeply scarped sides and a flat top [*3/602; 4/775, 4/776*] (see plate 32). The bank was presumably meant to catch stray ammunition from either of the adjoining butts, although in its current form it does not seem tall enough for this purpose

The Machine Gun Range

Historical Background

Unfortunately, as with the cannon test butts, this part of the airfield is not visible on the slide copy of the vertical aerial photograph taken in June 1942 (YCA HMU/L/22/17). It is not shown on the 1942 camouflage plan (see figure 8) but, as previously noted, this plan may have been simplified. On the 1945 airfield plan (YCA Y/ORD/4/6/52), the site is shown as extending beyond the northern edge of the airfield. This area is divided into two parts, the eastern part (numbered '22') is identified in the key as 'M.G. (machine gun) Range (6 Point)' (see figure 5A).

The 1945 airfield plan (YCA Y/ORD/4/6/52) depicts the machine gun range as an east-west aligned structure at the north end, longer than that at the cannon butts, with several conjoined rectangles of varying widths to the south and another to the north. There are no tracks or taxi-ways leading to it, although the short road or taxi-way noted above runs from the dispersal pits to the west, ending in an apparent turning circle almost in front of the gun range. The more detailed Ordnance Survey 25" map of 1967-69 shows the site as comprising a wall with a deep scarp running parallel to its south-eastern side (see figure 5B). There is then a parallel ditch set a short distance to the south-east, with a second long parallel structure to its south-east again - this latter structure is rectangular in plan, and is open-sided with 'posts' to the ditch but with small buildings at either end. There is also a linear earthwork bank between the northern wall and the adjacent cannon butts, presumably to catch any misaligned ammunition.

A typical 25 yard machine gun range consisted of a covered firing point, a sand area, a catch pit or trench for ricochets, and the sand-banked brick butt wall at the north end. The firing point was essentially a narrow open-fronted brick-built shed with a mono-pitch corrugated asbestos cement roof, with each gallery or bay open to the front, separated by either metal posts of brick pillars. The butt wall, which supported the sand bank, was the largest structure. A standard design for a firing shelter or firing point, dating to 1940 (Air Ministry 800/43) was issued for use in construction, and shows variations that could be implemented for different types of small arms (see figure 20).

Site Description (see Figures 18 and 19)

The best preserved structure of the machine gun range is the butts. Following vegetation clearance, they could be seen to be aligned north-east/south-west, although in the following description they are considered to be aligned east-west. The butts have maximum external dimensions of 40.0m east-west by 9.50m north-south, and stand up to 6.10m in height [*3/582; 4/764, 4/788, 4/791*] (see plate 33).

The main structural part of the butts comprises the rear (north) retaining wall and two smaller side walls, which are built of light red machine-made bricks laid in English Garden Wall bond and set with a cement mortar (see figures 18 and 19). The rear or north wall stands over 6.0m tall and survives to its full height. The north elevation has a chamfered inset set approximately half way up its height and

the central section is supported by six stepped buttresses, each of three stages with tumbled-in brickwork [*4/738-4/741, 4/743, 4/772, 4/773*] (see plate 34). Below the inset and between the buttresses, the wall is pierced by two rows of ceramic drainpipes which drain the scarp/bank on the south side (see below); there may be a third row of pipes now buried below ground level [*4/744-4/747*]. At the top of the eastern end of the wall, metal fittings may once have held a flagpole in place, used to fly a flag when live firing was taking place. The south elevation of the rear/north wall of the butts projects beyond the side walls at either end. These projections are largely blank, with a chamfered inset placed at a high level [*3/577; 4/748, 4/749*] (see plate 35).

The side walls of the butts are now both damaged and have partly separated from the rear wall [*4/805*], but they appear originally to have been of similar form. The side walls decrease in height evenly from north to south, and are supported by a central stepped buttress [*4/771, 4/777*] (see plate 36); there is also an internal pier or projection in line with the external buttress [*4/796, 4/797*]. On either side of the buttress, the side walls are pierced by three rows of ceramic drainpipes, the lowest row being barely visible above ground level [*4/750, 4/751, 4/765-4/769*]. The base of the south side of the butts is formed by a 3.70m high south-facing sand and earth scarp, contained within the rear and side walls; the top of the scarp is set at 18.00m AOD (see plate 33). The south elevation of the rear wall rises above the top of the scarp for 2.25m, with an inset approximately half way up its height; the inset is set at the same height as the chamfered inset on the much taller projections to either side. The main rear wall is topped by a course of headers laid on edge [*4/801, 4/802*].

Positioned some 3m to the south-east of the butts, and running parallel to them, is the catch pit or trench, water-filled at the time of the survey [*3/583; 4/753, 4/755, 4/799, 4/804*] (see figure 18 and plate 37). This is formed by a linear depression with rounded ends, measuring a maximum of c.32m long by c.13m wide. Both long sides of the catch pit are up to between 1.20m and 1.40m deep, but the northern side is much more steeply scarped, being less than a third of the width of the south side.

The firing point or building was positioned some 7.50m south-east of the catch pit, and c.14m south-east of the butts themselves. It has been largely demolished, the principal remains now comprising the concrete pad which formed the base [*3/590, 3/591; 4/762*] (see figure 18 and plate 38). This measures at least 29.0m long by 3.70m wide; the exact position of the eastern end is obscured by a spread of demolition rubble. Towards the eastern end, two of the brick pillars which once formed part of the open-front towards the butts remain, as does a section of the brick rear wall of the firing point [*3/586; 4/758-4/761*] (see plates 39 and 40). The pillars stand to a maximum height of 2.7m and have a bolt with a washer projecting from the top [*3/585*]. The bolts would have been used to secure the timbers of the mono-pitch corrugated asbestos cement roof. Only two sections of the rear wall surviving, standing to a maximum height of 2.25m, with rendering to the external (south) face. At the west end of the pad, brick walls visible in plan only suggest that there was a separate cell within the building here.

6 DISCUSSION

The Runways and Taxi-Ways

The combined aerial photographic and documentary evidence suggests that the surviving parts of the runways and perimeter taxi-ways within the survey area were built between June and October 1942, perhaps to coincide with the introduction of single-seater fighter aircraft, although there would obviously have been regular maintenance and repair throughout the whole period of airfield operation.

This June-October 1942 expansion extended the original triangular layout of three runways which had been developed by December 1940, and would have conformed to the Class A specification for a standard operational airfield which was developed in 1942. Class A airfields usually had the main runway sited on a north-east to south-west alignment, measuring 2,000 yards (c.1.828km) long by 50 yards (45.72m) wide. The subsidiary runways were somewhat shorter at 1,400 yards, with a 100 yard cleared area at both ends to allow for overshoots. Perimeter tracks or taxi-ways were built to a standard 50 feet (15.24m) width (Francis 1996, 23). It is curious that the extended runways at Clifton retained their 'bat handles' at the southern ends of Nos 2 and 3 runways, and also the two large circular areas on the east-west runway (Nos 1 and 4) (see figures 8 and 9); possibly these were used to allow for turning before the creation of the full length of the perimeter taxi-way.

All the runways and taxi-ways within the survey area are of sectional concrete construction covered with asphalt which survives in patches. The rectangular concrete panels have average dimensions of c.9.5m by 5.0m, although smaller or less regular panels are used on curving sections; where the edges can be seen, the panels are on average 0.10m thick. The significance of the '14/45' inscription seen on one of the concrete panels forming the eastern runway is unclear, although it might possibly relate to a period of repair. The survey recorded other areas of possible repair to the runways, normally taking the form of a narrow strip of concrete running across two or three lines of parallel rectangular panels.

The widths of the surveyed sections of the two runways (nos 5 and 6) are as given for a runway at a Class A standard operational airfield, but the 36ft (11m) width for the western taxi-way is somewhat less than might be expected, although it is the same as the other surviving perimeter taxi-ways within the survey area. At RAF Coltishall in Norfolk, after its re-designation as a fighter station, perimeter taxi-ways were only required to be 40ft wide and in one instance a surviving portion was measured at just 33ft between taxi track lights (Francis 2013a, 13-14); the latter figure is very close to the surviving width at Clifton, and again suggests that the taxi-ways date to around late 1942.

Permanent electric lighting began to be installed on UK military airfields from 1941. The first standardised electric system was based on a successful experimental design installed at Drem airfield in Scotland, although it was quickly superseded by an improved version which became standard through the conflict. It was known officially as 'Airfield Lighting (Mks. I and II)' but was generally referred to as 'Drem' (Francis 2013a, 17).

Although the fittings have been removed, the bases of the lights recorded along the perimeter taxi-ways at Clifton (see figure 14) form the remnants of a Drem Mk II lighting system - they resemble a type of light fitting known as 'T1', although there were several variations, and it is probable that further documentary research would uncover the exact type. The lights were shielded by a circular cast-iron dome, designed to withstand being run over by the heaviest aircraft, and with six light apertures placed around the edge of the dome. They were placed on both sides of a perimeter taxi-way, being spaced at 150 yards (137m) apart on straight sections while on curved sections the spacing was reduced to one quarter of the radius of the curve. The lights were fitted with amber screens on the outer edge of the perimeter taxi-way and blue on the inside edge (Francis 2013a, 18). Dismantled examples of T1 lights tend to have a circular recess at the base, as opposed to the square one seen at Clifton (Francis 2013a, 20; *https://dunsfoldairfield.org/runways/*). It is possible that the double/single light system in place at Clifton may have been an alternative way of marking the different sides of the taxi-way to the coloured screens mentioned above. The western taxi-way may also preserve evidence for a central line of fittings (perhaps lights?) running lengthwise which were subsequently removed and the damage repaired, but this is not certain.

The base of the different types of landing lights recorded along the eastern runway would also have formed part of a Drem Mk II system (see figure 14). They strongly resemble a type of light fitting known as 'C6' runway marker lights, although the Clifton examples differ to illustrated examples in that they were set into pre-cast chamfered blocks which stood slightly above ground level but were flush with the runway surface. These lights were shielded by a bi-directional domed cast-iron fitting, and were positioned on either side of the runway directly opposite one another, nominally spaced at intervals of 300 feet (91.44m) (Francis 2013a, 18). Dismantled examples of C6 lights have a plan form which looks very similar to those seen at Clifton, although they are set nearly flush with the runway surface, rather than being raised on pre-cast blocks (Francis 2013a, 19).

Both the recorded taxi-ways and runways at Clifton were flanked by buried brick drains or culverts. The inscriptions on the cast-iron drain covers show that they were manufactured by Dudley and Dowell Ltd of Cradley Heath. This company was formed in Blackheath by two brothers at the end of the First World War, with the later works in Cradley Heath (then in Staffordshire) being purchased in 1933. The works expanded over the years to encompass two foundries extending over nine acres, and the company merged with Brickhouse Foundry Ltd in 1967 (*www.fotolibra.com/gallery/1135528/dudley-dowell-ltd-drain-grating/*). Their mark appears on cast-iron products at numerous other airfields, such as RAF Coltishall in Norfolk (Francis 2013a, 37), and so it appears that they supplied the Air Ministry widely.

The early method of draining runways was to have full-length cast-iron grilles placed along the edges but, as runway lengths increased, it was proving too costly, and iron was in short supply. By 1941 this method was replaced by using a drainage apron along the sides of the runways connected to a French drain placed under the centre of the runway; this method continued to be used until 1944, although improvements and local variations were made. Typically, the runway was covered with a porous tarmac surface, and catch pits with cast-iron gratings acting as silt traps were provided at frequent intervals as an additional means of conveying surface water to the central French drain. This system was found not be totally successful as it had to be constructed accurately and blocked drains became common, and so early in 1944 it was replaced with continuous drainage channels and catch pits placed at regular intervals along both sides of a runway. It is quite likely that the perimeter taxi-ways were not drained so effectively, as aircraft speeds were much reduced on these surfaces (information from Airfield Research Group forum, entry by 'Carnaby', posted 13th August 2019). Other similar drains and cast-iron covers to those recorded at Clifton have been noted at Dunsfold airfield in Surrey (*https://dunsfoldairfield.org/runways/*).

The discovery of the camouflage plan dating to October 1942 is significant, and proposals included the creation of dummy hedges and roads, painting large black patches to break up the runway alignments, and to cover one of the runways with wood chippings. It is not known how many of the recommended camouflage measures were carried out; none of the dummy hedges or roads are shown on 1946 or 1951 aerial photographs (see figure 10) for example, although the darker colours of the main runways may be suggestive. Unfortunately, no evidence for these camouflage techniques was visible at the time of the survey, although it has been seen at other airfields, such as tar and wood chip runway coverings at Dunsfold (*https://dunsfoldairfield.org/runways/*).

The large cylindrical metal tank located at the northern end of the western runway is an interesting feature, and the metal plate at one end of the tank contains some text, the meaning of which is presently unclear. It is possible that a reference to 'HT' may indicate that the tank stored something that was kept warm to avoid partial solidification in cold weather, such as heavy diesel or fuel oil. It is interesting to note that a very similar tank has been identified at another former airfield at RAF Downham Market, Norfolk (*https://www.forgottenairfields.com/airfield-downham-market-*

1451.html). It was used as part of its Fog Investigation and Dispersal Operation (FIDO) system whereby oil or petrol stored in the tank was pumped out along pipes buried along the edges of a runway, and then out through burner jets which were lit to create rows of flame along the runway. This had the effect of heating the air to clear or prevent the build up of fog, so that aircraft could land safely (Williams 1995). However, Clifton is not one of the listed FIDO airfields, and the possible date of '17-5-57' on the metal plate suggests it is unlikely to be a wartime remnant (unless it was subsequently re-used) as the airfield closed in 1952. It was subsequently confirmed that the tank had been brought to Clifton from Teesside in the 1990s to store liquid fertiliser (Mr Ben Cleminson, landowner, *pers. comm.*), although this is not to say that it wasn't originally a wartime remnant.

Although not an 'active' airfield in terms of operations, it is quite likely that the Clifton airfield would have been provided with a variety of different defences (Francis 2013a, 26-33), to cover both air and ground attack (e.g. light anti-aircraft guns such as bofors gun emplacements, pill boxes or machine gun positions). The 1945 Air Ministry plan (see figure 9) does not show any defences, although there are a number of air raid shelters and blast shelters in the mess area. No defensive structures were recorded within the survey area, which may reflect their original wartime positions or simply be due to post-war demolition and removal.

The Bulk Petrol Installation

In many ways, the bulk petrol installation is the most interesting element of the airfield to survive. Such peripheral structures are often overlooked in favour of more visually impressive buildings such as control towers and hangars, and when excavated, the Clifton example was better preserved than might have been expected following the late 20th century clearance works. The 1945 Air Ministry plan shows two such 24,000 gallon installations, on the western and eastern sides of the airfield (see figure 9).

The western site shares a number of characteristics with other known examples, and also with the October 1940 Air Ministry design for a 24,000 gallon aviation petrol installation (see figure 15). The design shows that builders and petrol specialists were used to build the installation, but that the meters and tanks themselves were supplied by the Air Ministry. A typical bulk petrol installation for an active bomber station would have had a total capacity of 72,000 gallons, whereas a pre-war fighter station would have had two 48,000 gallon installations (Francis 2013b, 12). The 1945 plan shows that Clifton had two 24,000 gallon sites, as well as an MT 50,000 gallon petrol installation and a 5,000 gallon bulk oil installation. The size of the bulk petrol installation at Clifton again supports the suggestion that it was built in late 1942, as implied by the various historical sources.

The western site was located on the perimeter of the airfield, presumably to minimise damage to other structures in the event of an explosion, but adjacent to a taxi-way to allow easy vehicular access; there was a direct access to the site from Rawcliffe Lane to the west to avoid passage through the rest of the airfield. The eastern site is similarly placed, with an access from Wigginton Road. Petrol would have been brought to the airfield from the main RAF Yorkshire fuel store at Rawcliffe Bridge (near Goole), either by pipeline or more likely in convoys of tankers (Roger Thomas, Conflict Archaeologist, *pers. comm.*). Tankers would have arrived on the elliptical roadway and offloaded their petrol. Francis (2013b, 12) suggests that this was done on the narrower part of the elliptical roadway (i.e. the north side at Clifton) via a set of six pipes and valves, as is shown on the Air Ministry design. The wider part of the roadway (to the south at Clifton) would have provided space for two RAF tankers to park and be filled with petrol, after which they would drive out to the aircraft that were dispersed around the airfield (Francis 2013b, 10).

The main body of the excavated chamber measured 10.25m long by 3.50m wide internally, which corresponds closely to the Air Ministry design, where the 12,000 gallon tank is shown to be 30ft (9.14m) long by 9ft (2.74m) in diameter (see figure 15). However, the positioning of the tanks is quite different, as they are raised above ground level rather than being buried below it. This may well have been due to local ground conditions at Clifton, which have a tendency towards becoming waterlogged, and this above-ground construction is seen elsewhere, and in some cases a ramp was provided for tankers to supply the tanks (e.g. at RAF Hardwick, Norfolk - *http://www.ukairfields.org.uk/hardwick.html)*.

At Clifton, an above-ground chamber was constructed to hold each of the two tanks; the chambers measured 10.25m long by 3.50m wide internally, making them only slightly larger than the tanks. Each chamber had a concrete floor, the base of which was set c.0.50m lower than the surface of the elliptical concrete roadway. The floor incorporated pairs of opposed brick piers with curving upper surfaces to support the tank. Alternating with these piers were pairs of anchor points, used to secure the ends of the steel cables which ran across the top of the tank, helping to hold it in place. The walls of the chamber were built of brick, which was partly rendered to a height of 0.45m above the floor, and they were at least 2.05m high and, given the diameter of the tank, must presumably have once been higher than this. It is assumed that the chamber was provided with some sort of reinforced roof, and the 1988 photographs imply that the remnants of a flat concrete roof were then present (see figure 3C). The concrete steps visible on the photographs at the south end of each chamber would have been used to access the top of the chamber and tank. The squat brick structures adjacent to the north end of each chamber, once rising slightly higher than the chamber itself, might have contained vents to allow petrol vapour to disperse from within the tanks, or could perhaps have marked where the pipes bringing petrol into the tank entered the chamber. No *in situ* cast-iron pipes were found in the excavation, although it was clear that some were still present elsewhere, and there were many *ex situ* sections.

Once built, each chamber was surrounded by earthwork scarps to form the mounds which survived at the start of the recording (see figure 4); given that the tanks were raised above ground, the mounds would have acted as some protection and also perhaps an anti-straffing device. The undisturbed portions of both banks that were exposed in the evaluation trenches show that each had a similar make-up. The base was formed by a horizontal layer of compacted black silty sand. The main body of the mound, comprising a dark-brown sandy silt, had an upper surface scarped to the same profile as the mound itself, and was overlain by a similar topsoil. The concrete skirt surviving at the base of the east side of mound 'A' is an unusual feature, and does not occur on other recorded or illustrated examples. This must have acted as further protection for the chamber housing the tank, again in response to the fact that it was not buried below ground level. It is assumed that the skirt originally continued around the whole of both mounds, although there was little surviving evidence of this elsewhere. At some point after 1945, the petrol tanks were removed from the inside of the chambers. In the case of the western tank, this was done by breaking into the west side of the chamber, disturbing the mound here and leading to the appearance shown on the 1988 photographs. Presumably the tanks were salvaged for use elsewhere.

The two pump houses at Clifton are similar to those shown in the original Air Ministry design (see figure 15). Pipes (labelled as 'suction pipes') would have entered the east and west walls of the pump houses from the petrol tanks, with a delivery pipe leaving the west wall to run south towards the RAF tanker position on the roadway. Each pump house was fitted with a pump and motor unit, represented by the larger of the two machine bases, with the smaller base supporting the starter gear. The fact that the structures formerly had flat concrete roofs dates them to post-1940, as the earlier versions had pitched roofs (Roger Thomas, Conflict Archaeologist, *pers. comm.*). Between 1988 and

2002, further disturbance to the site took place, with almost all of the structures, including both pump houses, being demolished to ground level.

Examples of bulk petrol installations have been noted on other former RAF airfields, for example at RAF Coltishall in Norfolk (Fisher 2013b), RAF Hardwick in Norfolk (*http://www.ukairfields.org.uk/hardwick.html*), RAF Harrowbeer in Devon (*http://www.rafharrowbeer.co.uk/picts/aerial_Harrowbeer2.JPG*), RNAS Dale in Haverfordwest (Pyper & Page 2012, 44), and RAF Ibsley in Hampshire (*http://atlantikwall.co.uk/atlantikwall/e_h_ibsley_airfield_site.php*). The available evidence suggests that there are a range of different types. An interesting comparable example to the pump houses at Clifton can be seen at RNAS Dale at Haverfordwest, where it is placed alongside an elongated elliptical roadway in the south-east part of the airfield; this installation was for 48,000 gallons, as opposed to the 24,000 gallons at Clifton (Roger Thomas, Conflict Archaeologist, *pers. comm.*) (see figure 3E). A similar arrangement was also present at the Boulmer Aerodrome in Northumberland, which was developed after November 1942 from a decoy airfield (*https://www.fusilier.co.uk/alnmouth_northumberland/history_of_raf_boulmer.html*). At Winkleigh airfield in Devon, the bulk petrol installation is described as comprising a brick-built central building with a more modern corrugated roof, a road/hard standing for tankers and a number of square brick-lined pits which used to contain the pumping equipment for the petrol tanks (*http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV56240&resourceID=104*). A small building with a later corrugated roof also survives at the Installation at RAF Little Snoring in Norfolk (*http://www.ukairfields.org.uk/little-snoring.html*). At RAF Davidstow Moor in Cornwall, which was operational between 1942 and 1945, the bulk petrol installation has at least one earth bank with six sub-square brick structures rising from it; these are rendered to the interior, as with the surviving example at Clifton. There is a small single storey brick structure adjacent with a flat concrete roof and modern colour aerial photography suggests that it was also served by an enclosing roadway as at Clifton *(https://www.derelictplaces.co.uk/main/military-sites/16586-raf-davidstow-moor.html).* Finally, a Second World War bulk petrol installation at RAF Feltwell in Norfolk has been subject to a historic building survey, but this was of a different design, with six underground metal tanks with concrete superstructures (Brooks 2009).

The Cannon Testing Butts

The cannon testing, or shooting-in, butts are similar to examples surviving or noted elsewhere at numerous other former RAF airfields, and they are usually associated with a machine gun range (see below). These structures were generally located on the perimeter of airfields, and so many still survive in varying states of repair.

The term 'cannon' refers to the 20mm Hispano gun used in many fighter-type aircraft, and cannon projectiles required an enclosed butt filled with a greater depth of sand than that seen at small arms butts (Airfield Research Group forum, entry by 'Petertheeater', posted 11/04/2013). Airplanes would therefore have accessed the butts from the perimeter track, and the 'T-stand' to the south of the butts formed an area of hard standing where an aircraft was tethered prior to firing (Francis 2013c, 25-26); test firing was required to both align and focus the guns to a specific point, and also to diagnose any ammunition feed problems. Contemporary wartime photographs show how testing was done, with the tails of the fighter aircraft being raised and supported to simulate flight attitude, so that their guns were firing level at the butts (see figure 5C). As an alternative, it is also known that individual cannons or guns were secured on a triangular mount to fire into the butts (Airfield Research Group forum, entry by 'Petertheeater', posted 25/02/2011). These cannon butts were only used by fighter aircraft, as bombers guns were not coned or angled to produce a focus at a given range (Roger Thomas, Conflict

Archaeologist, *pers. comm*.) - bombers have their own design of shooting-in butts, usually a semi-circular earth bank often placed at the back of an aircraft dispersal area (information from Airfield Research Group forum, entry by 'Petertheeater', posted 16th May 2012).

Earlier examples of the fighter cannon butts were formed by a single full width roofed opening, into which machine guns or cannons were fired, but many were later modified to have several smaller bays such as that seen at Clifton. As there is no evidence for any such modification, it seems likely that it was built later in the war, and this would tie in with the various historical information noted in Chapter 4 above which suggests it dates to later 1942.

The ends of the walls forming the six brick-built bays at Clifton contain bolts which were used to secure timbers or other fittings running across the top of the bays. These would have almost certainly formed part of the roof structure, as the butts would once have been covered by a roof; at RAF Coltishall in Norfolk, the wartime cannon test butts once had steel lattice roof girders covered with asbestos sheeting (Francis 2013c, 25-26). The ends of the walls are also rebated from 0.50m to 1.60m above ground level, with two protruding horizontal bolts. It is assumed that the rebates were used to secure targets or other such devices to the front of the bays. It is assumed that the bays themselves would have been filled with sand, gravel or shingle to receive the shells, and some examples elsewhere also contained angled steel plates to deflect shells downwards into the sand; some bays contained apertures in the back and roofs of the bays through which sand could have been poured or replenished. However, Francis (2013c. 25-26) suggests that the later examples did not contain any such material, and this would tie in with the Clifton evidence.

Examples of both cannon butts can still be seen at Davidstow Moor, Cornwall (*http://www.atlantikwall.co.uk/oldsite/atlantikwall/cornwall/davidstow_butts/html/page03.htm*), RNAS HMS Blackcap in Cheshire (*https://historicaviationmilitary.com/stretton.html*), RAF Blakehill Farm in Wiltshire (*www.rafblakehillfarm.co.uk/shooting-in-butt-blakehill*), and RAF Charmy Down in Somerset (*www.geograph.org.uk/photo/5680082*).

The Machine Gun Range

The Clifton machine gun range lies adjacent to the cannon butts, and the various historical information suggests it also dates to late 1942. It contains the usual features seen as such sites, such as the firing shed, the catch pit and the sand-banked brick butt wall. Little now survives of the shed, with only the concrete base, a few sections of wall alignments and two of the pillars forming the open north side. The rear brick wall would have been pierced by multiple ventilation slots, to draw off the smoke produced by the firing of the machine guns (Roger Thomas, Conflict Archaeologist, *pers. comm*.) but nothing of these can be seen, although there is evidence for a separate cell at the west end of the pad, as suggested by the 1940 design (see figure 20). The addition of an extra bank between the machine gun and cannon butts is an interesting feature, and was presumably designed to collect ricochets and mis-directed shots.

Such ranges were used by personnel for small arms practice, but it is also possible that training with medium calibre munitions and close combat munitions (such as grenades) took place there; operational record books for RAF Clifton reference personnel taking part in grenade instruction at the airfield. RAF personnel were required to have ground defence training, and it was necessary to qualify on rifles and light machine guns every six months, and so 25 yard ranges were constructed at most operational flying or support units. The range was used also by armoury assigned personnel to test fire small arms after certain levels of servicing or repairs. In most cases, a light wire fence was run down each side to prevent wanderers from walking across the line of fire, and there were usually red

flags hoisted at both the firing point and the butts to signal live firing (information from Airfield Research Group forum, entry by 'Petertheeater', posted 18th May 2013). Targets varied from simple square cardboard 'dartboard' type to plywood-backed 'man' figures with scoring areas, and it was necessary to annually 'de-lead' the range by digging out the spent bullets from the sand directly behind the target locations; this was done to prevent or reduce ricochets (information from Airfield Research Group forum, entry by 'Petertheeater', posted 9th September 2009).

As with the cannon testing butts, there are several examples of machine gun ranges surviving at former airfields, such as at RAF Wymeswold in Leicestershire (https://sync-below.com/raf-wymeswold-28otu/), RAF Kinnell in Scotland (www.geograph.org.uk/photo/5930944), RAF Newton in Nottinghamshire (http://nijurbex.blogspot.com/2010/08/raf-newton-firing-range.html), RAF Dunkeswell in Devon, RAF in Oxfordshire (www.derelictplaces.co.uk/main/military-sites/19473-grove-airfield-shooting-range-html), RAF Morpeth (www.derelictplaces.co.uk/main/military-sites/21078-Raf-tranwell-raf-morpeth.html) and at the Imperial War Museum at Duxford in Cambridgeshire (ukairfields.org/duxford.html) (see figures 5D and 5E).

7 CONCLUSIONS

All of the remains associated with the former RAF Clifton (or York as it was sometimes called) subject to this survey on the north side of the A1237 York outer ring road are of interest and some importance, particularly as so little of the rest of the airfield now survives.

Land for an airfield at this site was originally purchased by York Corporation in June 1934, and it was opened in 1936 and operated by Yorkshire Aviation Services. The grass airfield was then requisitioned by the RAF in September 1939, and subsequently constructed as a Class A operational airfield, primarily as a relief airfield and dispersal site for Linton-on-Ouse. During its lifetime it was variously used by RAF Bomber Command, RAF Army Co-operation Command, the Fleet Air Arm, RAF Fighter Command and RAF Maintenance Command. Between 1941 and 1948, the site also became an important Civilian Repair Unit, as part of No. 48 Maintenance Unit, for the nearby Yorkshire airfields such as Linton-on-Ouse, Rufforth and Breighton which used four engined Halifax bombers. Several large engineering complexes were built, comprising hangars, workshops, mess sites etc, and some 4,000 were employed at the works, mostly women. More than 2,000 Halifax bombers were repaired during the war - the complete overhaul of a Halifax could be achieved in eight weeks compared to the 25 needed at an operational base. The airfield was also used by various other RAF squadrons, flying Westland Lysanders and single-seater American fighters, primarily Tomahawks and P51 Mustangs. The site was bombed and damaged during the York 'Baedeker' raid of 28th-29th April 1942. The RAF left in 1946 but the site was used to dismantle over half of the remaining national Halifax bomber fleet up until 1948. A small part of the military airfield also returned to civilian use, but the former repair and engineering works remained until 1952 when the site was officially closed. Much of the former military infrastructure survived until the 1980s, when most of the airfield on the south side of the A1237 was developed for housing and the Clifton Moor Retail Park.

All the structures recorded by the current survey, namely the sections of the runways and taxi-ways, as well as the bulk petrol installation, the machine gun range and the cannon 'shooting-in' butts, are associated with an expansion of the RAF airfield in late 1942, perhaps to coincide with the introduction of the single-seater fighter aircraft. Many examples of these structures survive at other former RAF airfields, in varying degrees of preservation, and comparison with these, together with the examination of original war-time designs, means that the Clifton remains can be accurately interpreted and understood.

All the runways and taxi-ways recorded by this survey are of sectional concrete construction covered with asphalt, and the taxi-ways are of a width suitable for fighters rather than bombers; none of the former dispersal pens lay within the survey area, although one still survives on the south side of the A1237. Both runways and taxi-ways preserve parts of a Drem Mk II lighting system, as well as contemporary drainage. No evidence for any airfield defences were recorded in the survey area, although there could have been some further to the south which no longer survive.

The above-ground remains of the bulk petrol installation were surveyed in early 2019 (see figure 4), but the current project involved some intrusive investigation. This revealed that, despite extensive disturbance in the post-war period and again between 1988 and 2002, the structural elements were relatively well preserved. The installation lies on the western edge of the airfield, and it is surrounded by an elliptical concrete roadway, which allowed tankers to supply the site and then disperse petrol in tankers around the airfield. The two linear 12,000 gallon tanks had been removed, presumably soon after the end of the war, but they had been housed in above-ground brick chambers, in contrast to the standard design which required them to be buried, presumably reflecting local ground conditions. The floor of each chamber contained a number of low brick piers to support the tank, and additional anchor points were used to secure steel cables which ran over and across the tank. Earlier photographs suggest that the chambers were provided with a reinforced flat roof, accessed by concrete steps, and each chamber was surrounded by an earth bank for security and protection. Two pump houses positioned between the mounds were equipped with a pump and motor unit, and associated starter gear; the northern pump house would have received the petrol while the southern pump house incorporated a stand post to supply tankers for dispersal of the petrol to the aircraft around the field.

The canon testing butts and machine gun range are relatively well-preserved, and are similar to examples surviving or noted elsewhere at other former RAF airfields. The cannon butts are of a mid-war design, and incorporate six brick-built bays into which machine guns or cannons mounted in fighter aircraft would have been fired, having been secured to an area of hardstanding accessed from the airfield perimeter taxi-way. The butts structure at the machine gun range is a more substantial feature, although little now remains of the actual firing shed. This range would have been used by RAF personnel to maintain their ground defence training.

8 BIBLIOGRAPHY

Primary Sources

1854 Ordnance Survey 6" to 1 mile map Yorkshire sheet 157 (surveyed 1848-52)

1893 Ordnance Survey 25" to 1 mile map Yorkshire sheet 157/13 (surveyed 1891)

1893 Ordnance Survey 25" to 1 mile map Yorkshire sheet 157/14 (surveyed 1891)

1940 *25 Yds Machine Gun & Cannon Range Etc* (Department of Works drawing 800/43)

1940 *Petrol Installation 'F' Type Aviation. 24,000 Gallons. Layout & Details* (Air Ministry design 15425/40).

1941 Ordnance Survey 25" to 1 mile map Yorkshire sheet 157/13 (revised 1938)

1941 Ordnance Survey 25" to 1 mile map Yorkshire sheet 157/14 (revised 1938)

c.1938 Yorkshire Aviation Services handbook (YCA HMU/14/20)

1942 York L G CAM scheme (ERAO DDX 589/2)

1945 Air Ministry - York - Record Site Plan November 1945 (YCA Y/ORD/4/6/52)

c.1950s to c.1991 Packet of Newspaper Clippings and Photocopies concerning Clifton Airfield (YCA HMU/14/20)

1952 Ordnance Survey 6" to 1 mile map Yorkshire North Riding sheet 157SW (revised 1950)

1957-1960 Black and white photographs of Rawcliffe Aerodrome taken by York Corporation (YCA Y/PPT/1/2/60)

1958 Ordnance Survey 6” to 1 mile map Yorkshire North Riding sheet 157SW

1967-69 Ordnance Survey 1:2500 scale map (*https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954*)

Undated Hugh Murray photographic collection: packet of black and white photographic prints (YCA HMU/P/9/61-70)

Undated Hugh Murray photographic collection: box of slides (YCA HMU/L/22/17)

Undated Hugh Murray photographic collection: box of slides (YCA HMU/L/22/18)

Undated Hugh Murray photographic collection: box of slides (YCA HMU/L/22/19)

Secondary Sources

Abraham, B 2005 ‘Ministry of Aircraft Production Type “R” Hangers’. *Airfield Review* no. 107, 68-70

Abraham, B H (no date) ‘York/Clifton/Rawcliffe’. *Airfield Review* no. 46, 4-5

Benfield, D (undated) ‘York/Clifton: part 1’. Airfield Research Group Newsletter vol 4(6), 3-5 (= *Airfield Review* no. 25)

BHA (Barton Howe Associates) 2019 *City of York Council, York Northern Outer Ring Road, Clifton Moor Junction: Cultural Heritage, Simple Assessment Report*

Brooks, R 2009 *Air-raid Shelter, Bulk Fuel Installation and Water Tank, RAF Feltwell* (Suffolk County Council Archaeology Service report 2009/233)

Brown, D H 2011 *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation* (Archaeological Archives Forum)

Bruce, G 2015 *Land at Whitehall Grange, Wigginton Road, York: An Archaeological Desk Based Assessment* (unpublished On Site Archaeology report OSA15DT05)

CIfA (Chartered Institute for Archaeologists) 2014a *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures*

CIfA (Chartered Institute for Archaeologists) 2014b *Standard and guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*

CIfA (Chartered Institute for Archaeologists) 2014c *Standard and Guidance for Archaeological Field Evaluation*

CIfA (Chartered Institute for Archaeologists) 2014d *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*

English Heritage 1991 *The Management of Archaeological Projects*

English Heritage 2006 *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*

English Heritage 2007 *Understanding the Archaeology of Landscapes: a Guide to Good Recording Practice*

Francis, P 1996 *British Military Airfield Architecture: From Airships to the Jet Age*

Francis, P 2013a *RAF Coltishall A Historical Appraisal Parts 1-7. Part 3: Airfield Design and Construction (*available at *http://www.heritage.norfolk.gov.uk/Data/Sites/2/media/scottow/historicalappraisalpt3airfielddesignandconstruction.pdf*)

Francis, P 2013b *RAF Coltishall A Historical Appraisal Parts 1-7. Part 8: Hangars and Control Tower* (available at *http://www.heritage.norfolk.gov.uk/Data/Sites/2/media/scottow/historicalappraisalpt8hangarsandcontroltowers.pdf*)

Francis, P 2013c *RAF Coltishall A Historical Appraisal Parts 1-7. Part 9: Technical Buildings* (available at *http://www.heritage.norfolk.gov.uk/Data/Sites/2/media/scottow/historicalappraisalpt9technicalbuildings.pdf*)

Halpenny, B B 1982 *Action Stations 4: Military Airfields of Yorkshire*

Historic England 2015 *Digital Image Capture and File Storage: Guidelines for Best Practice*

Historic England 2016 *Understanding Historic Buildings: a Guide to Good Recording Practice*

Jefford, C G 1988 *RAF Squadrons, a Comprehensive Record of the Movement and Equipment of all RAF Squadrons and their Antecedents since 1912*

Otter, P 1998 *Yorkshire Airfields in the Second World War*

Pyper, A & Page, M 2012 *Twentieth Century Military Sites: Airfields - A Threat-Related Assessment 2011-2012* (Dyfed Archaeological Trust report 2011/48)

Robinson, T 2008 *Former Grain Store, Water Lane, York: Report on an a Photographic Survey of a Standing Building* (unpublished On Site Archaeology report OSA08BS02)

Simmons, M G 2004 'Aerodrome Landing Ground Camouflage 1939 to 1943'. *Airfield Review* no. 102, 23-26

Spence, N 1999 *The Story of Clifton Airfield, York: 'The Airport that Never Was'*

Thompson, D E 1994 'York Aerodrome Remembered'. *Airfield Review* no. 65, 20

Wenkel, M, Lang, S & Sainsbury, M 2018 *Clifton Moor UXO Desk Study & Risk Assessment* (unpublished Zeticauxo report for Pell Frischmann)

Williams, G 1995 *Flying Through Fire: Fido - The Fogbuster of World War Two*

Internet Sources (accessed between May 2018, and March 2020)

http://atlantikwall.co.uk/atlantikwall/e_h_ibsley_airfield_site.php = RAF Ibsley, Hampshire Airfield Site

http://www.cliftonwithout-pc.org.uk = Clifton Without Parish Council website

http://www.controltowers.co.uk = Control Towers

https://www.derelictplaces.co.uk = Derelict Places, Documenting Decay

https://dunsfoldairfield.org = Dunsfold Airfield History Society

https://www.forgottenairfields.com = Abandoned Forgotten and Little Known Airfields in Europe

https://www.fotolibra.com/gallery/1135528/dudley-dowell-ltd-drain-grating/ = Dudley & Dowell Ltd Drain Grating

https://www.fusilier.co.uk = History of RAF Boulmer

https://www.geograph.org.uk/photo/5680082 = Gun Testing Butts at RAF Charmy Down, Somerset

http://www.heritagegateway.org.uk/gateway = Heritage Gateway website

https://historicaviationmilitary.com/stretton.html = Stretton Airfield - Royal Naval Air Station (RNAS) HMS Blackcap Cheshire

http://www.militaryhistories.co.uk/york/target_york = Military Histories: the Baedeker Raid on York: Target York

http://nijurbex.blogspot.com/2010/08/raf-newton-firing-range.html = RAF Newton firing range

https://www.old-maps.co.uk = Old Maps

https://www.rafblakehillfarm.co.uk/shooting-in-butt-blakehill = The Shooting In Butt

http://www.rafharrowbeer.co.uk/picts/aerial_Harrowbeer2.JPG = RAF Harrowbeer, Yelverton

https://sync-below.com/raf-wymeswold-28otu/ = RAF Wymeswold 280TU & 44 Group Transport Command, Part 2

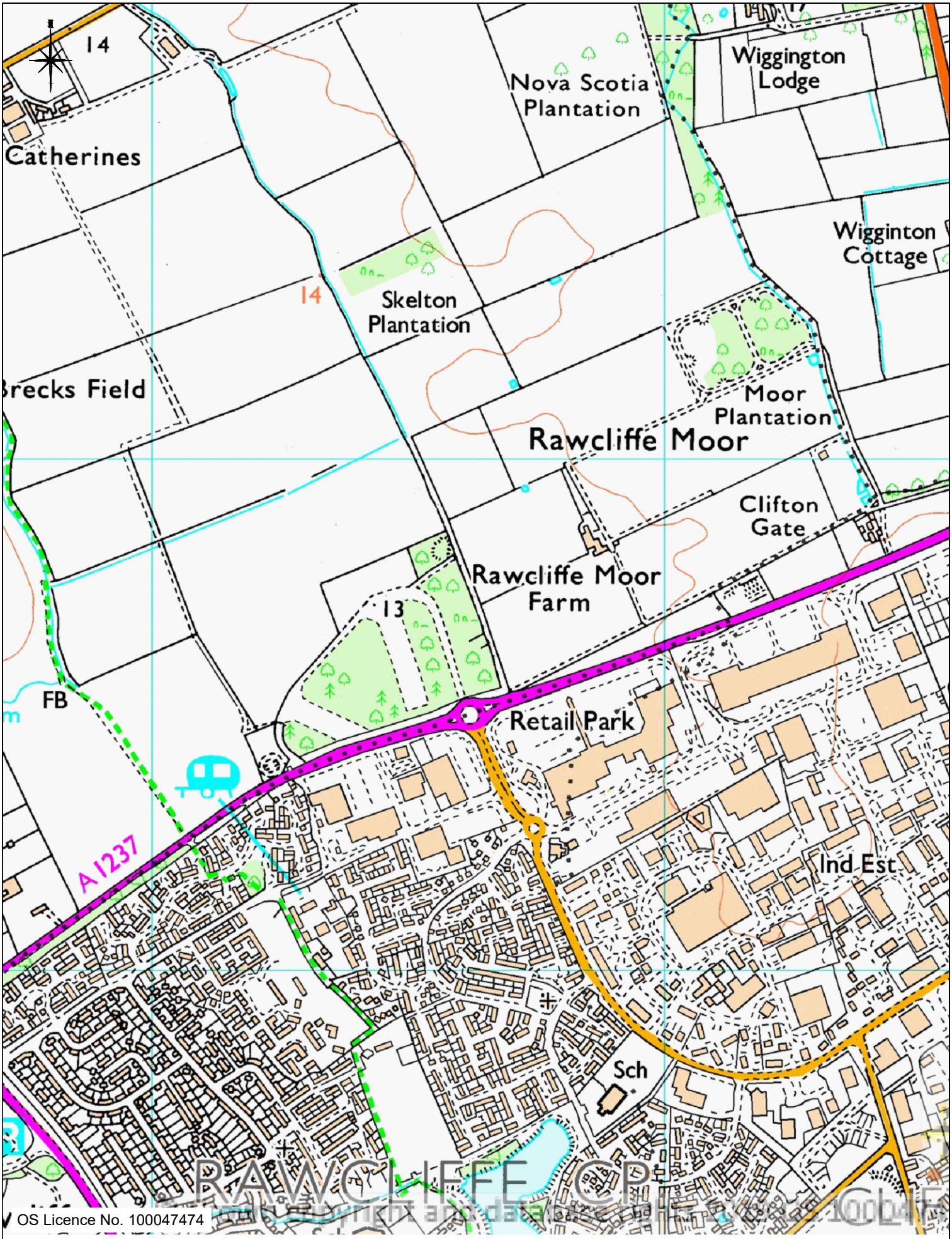
http://www.ukairfields.org.uk = UK Airfields

9 ACKNOWLEDGMENTS

The archaeological survey work at the former RAF Clifton airfield was undertaken by Ed Dennison Archaeological Services, on behalf of Barton Howe Associates. Fieldwork was undertaken by Dave Kempley of Benchmark Surveys and Shaun Richardson (EDAS), with assistance from Richard Lamb, Richard Coates, Tim Robinson and Ed Dennison. Shaun Richardson took the site photographs and produced the site survey drawings. Vegetation clearance was undertaken by Lewis Tree Surgery. The help and co-operation of the landowners, Messrs Ben and Toby Cleminson, was greatly appreciated.

The majority of the historical research was completed by Ed Dennison, and the contributions of Roger Thomas (Conflict Archaeologist) and members of the Airfield Research Group is greatly acknowledged. Initial reporting was by Shaun Richardson and Ed Dennison, and the final report was produced by Barton Howe Associates. The project was wholly funded by City of York Council.

FIGURES



Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL

Title	Project No.	Figure No.	Rev
GENERAL LOCATION PLAN	17/1027/PFCL	FIGURE 1	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

Area of
airfield survey

Canon butts and
machine gun range

Bulk petrol
installation

A1237

A1237

CLIFTON MOOR
RETAIL PARK

CLIFTON MOOR
RETAIL PARK

Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

DETAILED LOCATION PLAN

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

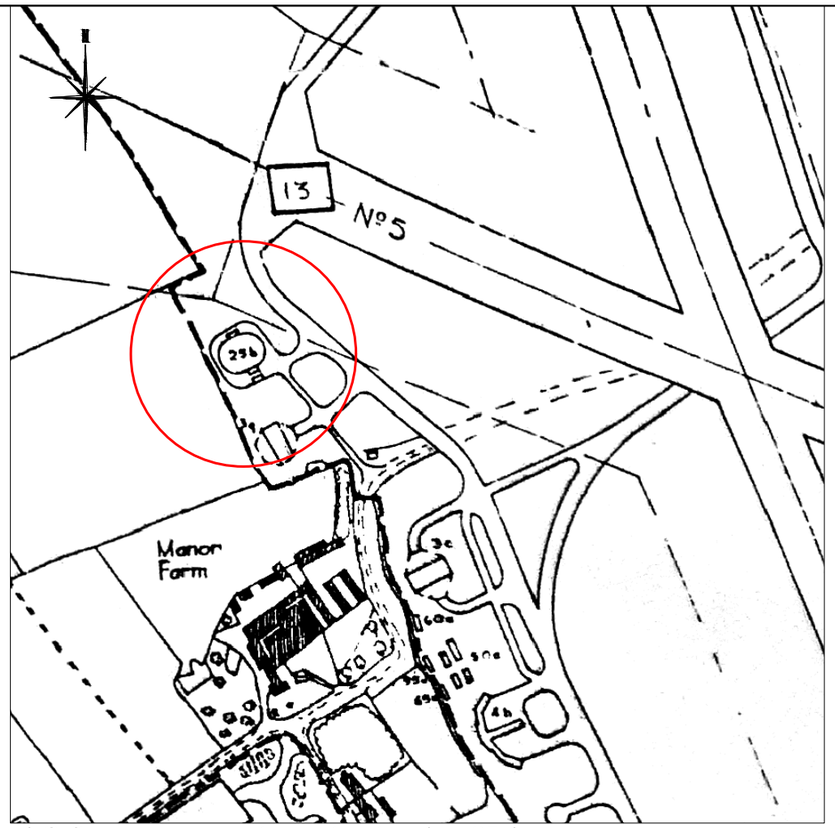
Size	Scale	Status
A3	NTS	FINAL

Figure No.

FIGURE 2

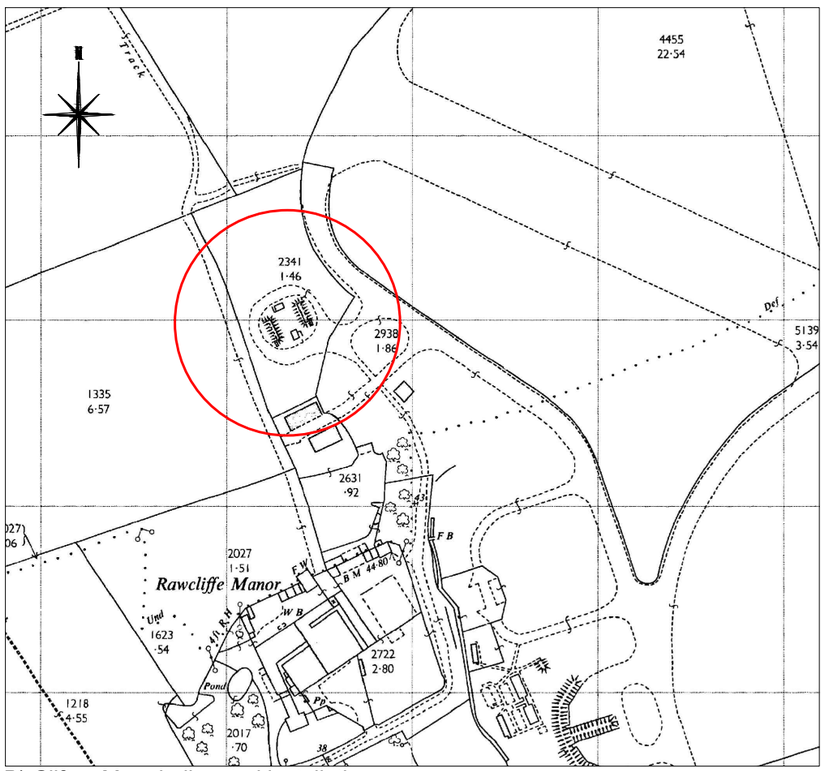
Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



A) Clifton Moor bulk petrol installation (no. 25b)
(source: 1945 Air Ministry plan, YCA Y/ORD/4/6/52).

C) Clifton Moor bulk petrol installation in 1988 and after demolition in 2002 (top right)
(source: *http://www.controltowers.co.uk/C/Clifton.htm*).



B) Clifton Moor bulk petrol installation
(source: 1967-69 Ordnance Survey 1:2500 scale map,
https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954).

D) Clifton Moor bulk petrol installation
(source: Google Earth aerial photograph, August 2015).

E) Fuel pump house at RNAS Dale, Haverfordwest (photo courtesy Roger Thomas, Conflict Archaeologist).

Rev	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL
PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: BULK PETROL INSTALLATION

Created by	Reviewer	Date
PAT	ED	03/20

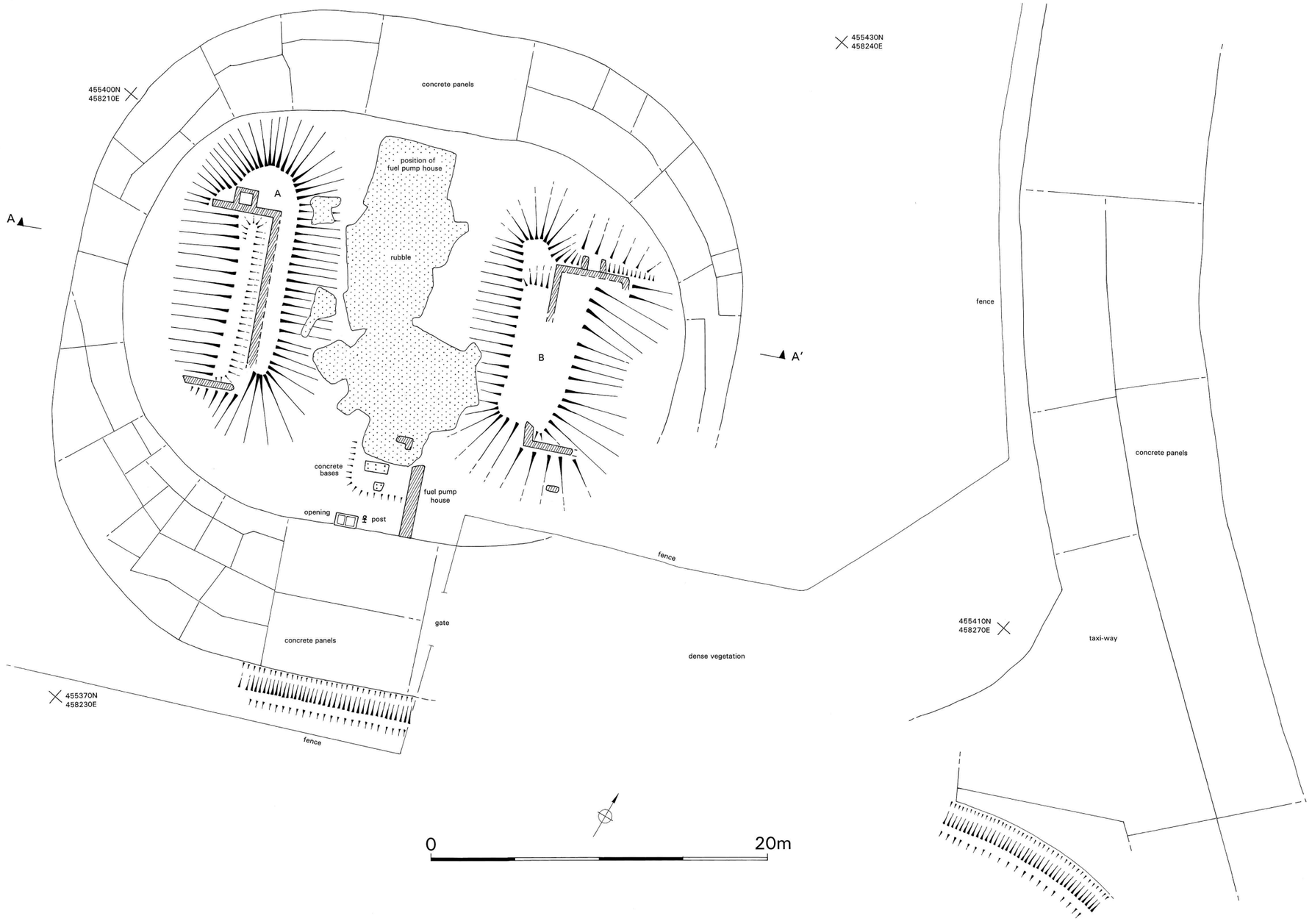
Project No.: 17/1027/PFCL

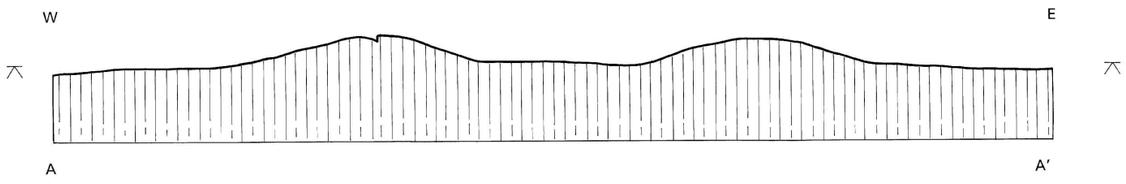
Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 3**

Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP





Section A-A′

0 20m

Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

BULK PETROL INSTALLATION SURVEY PLAN 2019

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

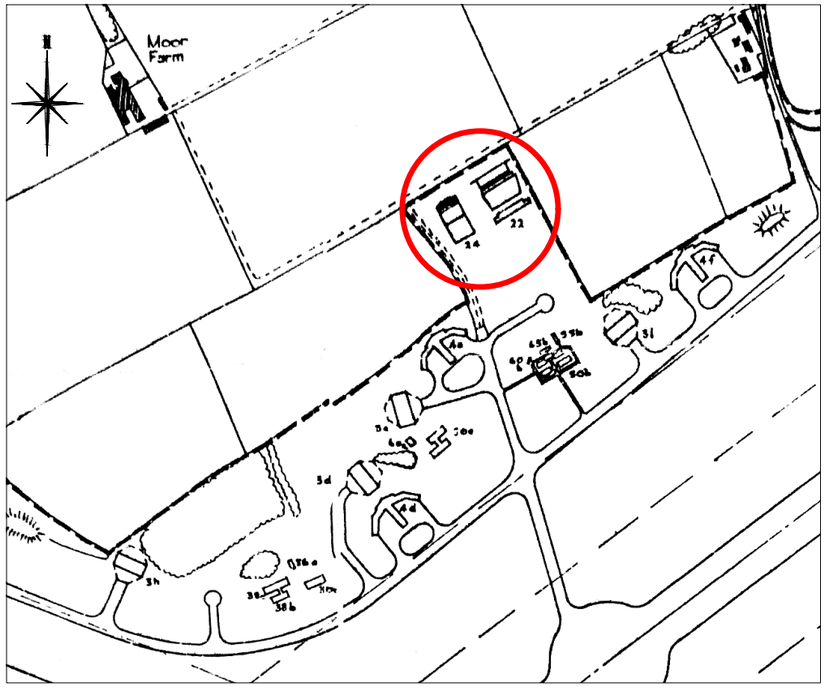
Size	Scale	Status
A3	AS SHOWN	FINAL

Figure No.

FIGURE 4

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

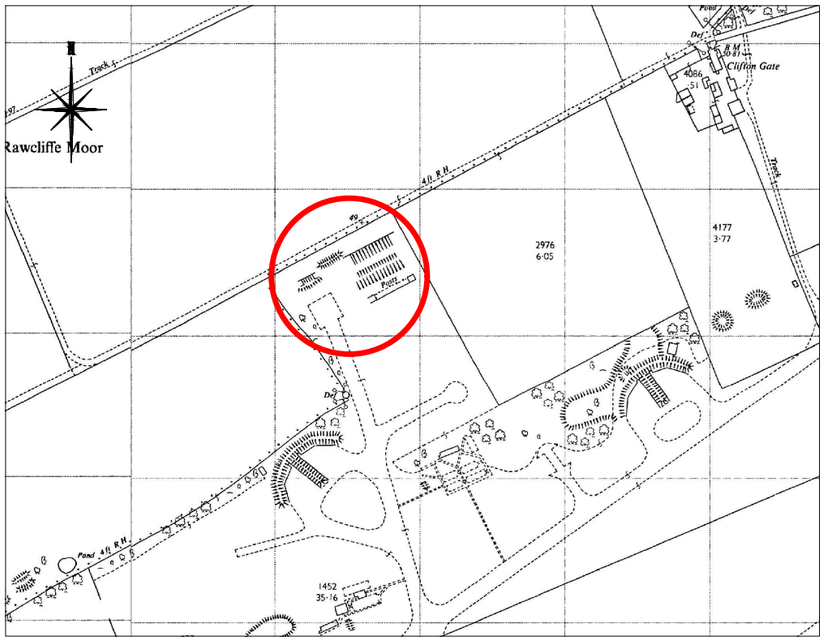


A) Clifton Moor canon butts and machine gun range (nos 24 and 22) (source: 1945 Air Ministry plan, YCA Y/ORD/4/6/52).

C) Spitfire firing at gun butts at Digby, Lincolnshire (source: ©Imperial War Museum photograph C 411).

D) Machine gun range wall at RAF Newton (source: *http://nijurbex.blogspot.com/2010/08/raf-newton-firing-range.html*).

E) Canon testing butts at Imperial War Museum, Duxford.



B) Clifton Moor canon butts and machine gun range (source: 1967-69 Ordnance Survey 1:2500 scale map, *https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954*).

F) Clifton Moor canon butts and machine gun range (source: Google Earth aerial photograph, August 2015).

Rev	Description	PM	Review	Date

Client: PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CANNON TESTING BUTTS
AND MACHINE GUN RANGE

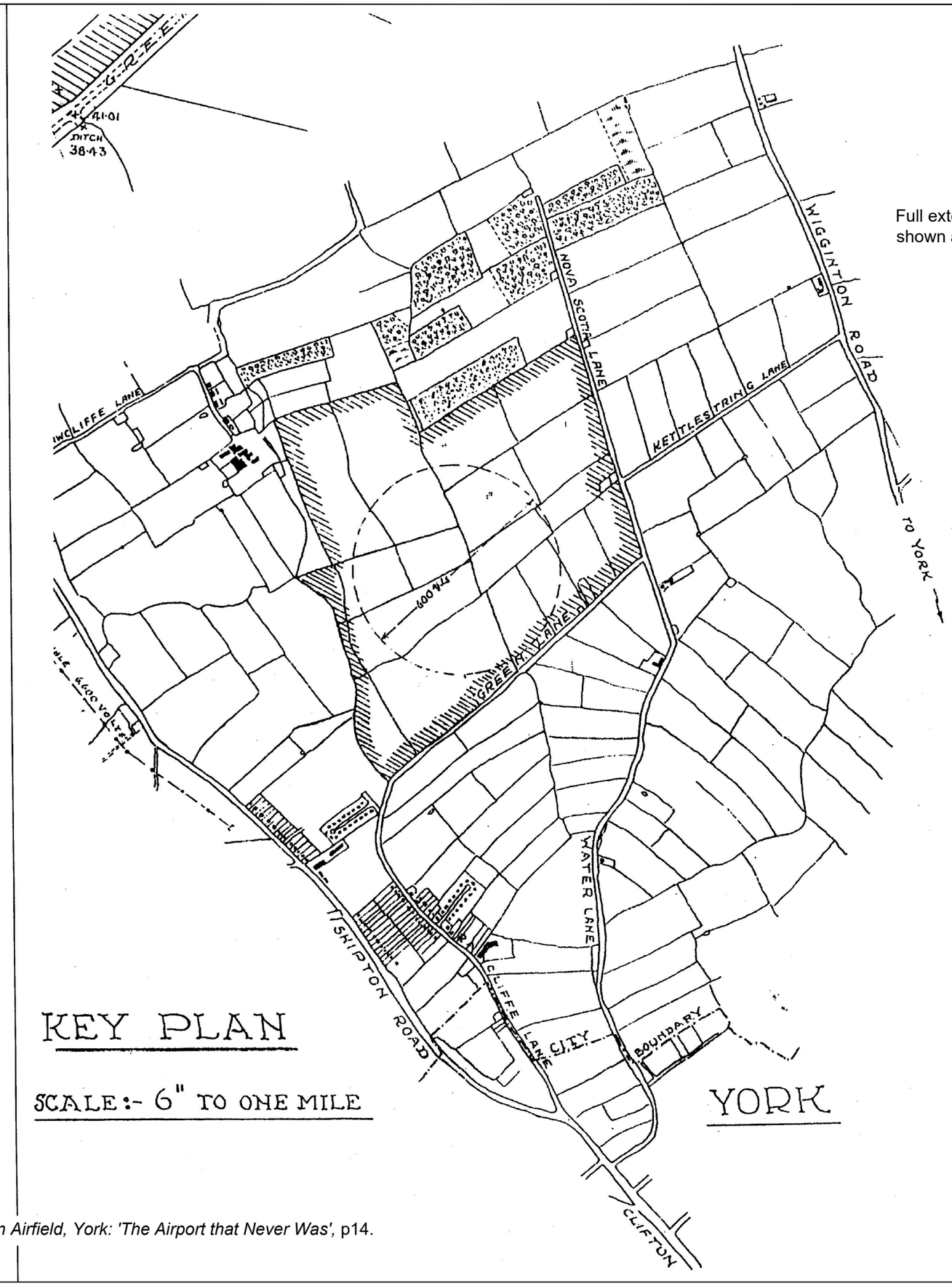
Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 5** Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Full extent of purchased land shown as hatched

Source: Spence, N 1999 *The Story of Clifton Airfield, York: 'The Airport that Never Was'*, p14.

Rev	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL
PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CLIFTON AIRFIELD ORIGINAL LAYOUT PLAN C.1935

Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

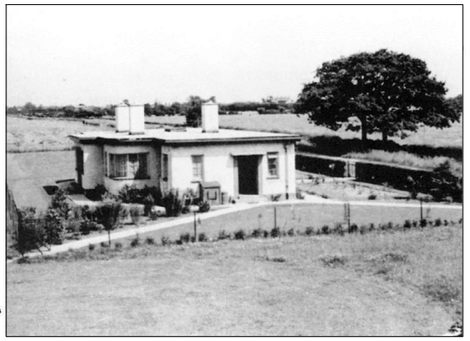
Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 6**

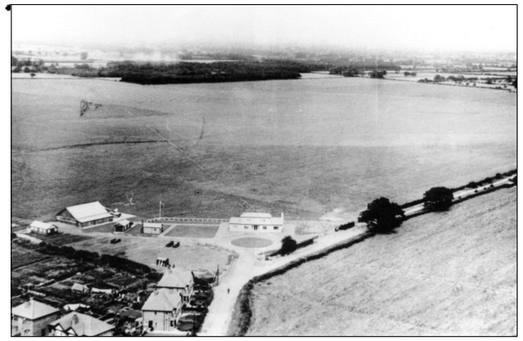
Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

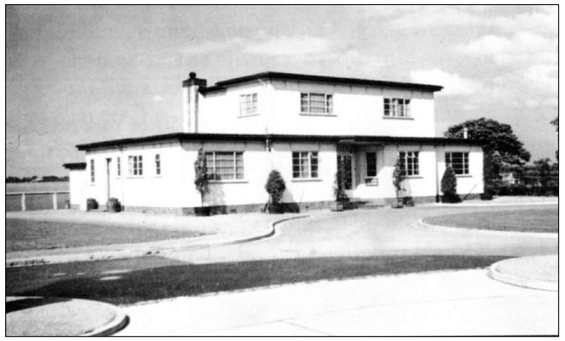
Bungalow on Green Lane



General view of airfield looking north



The Club House



Sources of photographs: Spence, N 1999 *The Story of Clifton Airfield, York: 'The Airport that Never Was'*, pp.18,19 & 21.

Source: 1941 Ordnance Survey 25" to 1 mile map Yorkshire sheet 157/13 (revised 1938).

Rev	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL
PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CLIFTON AIRFIELD FACILITIES IN 1938

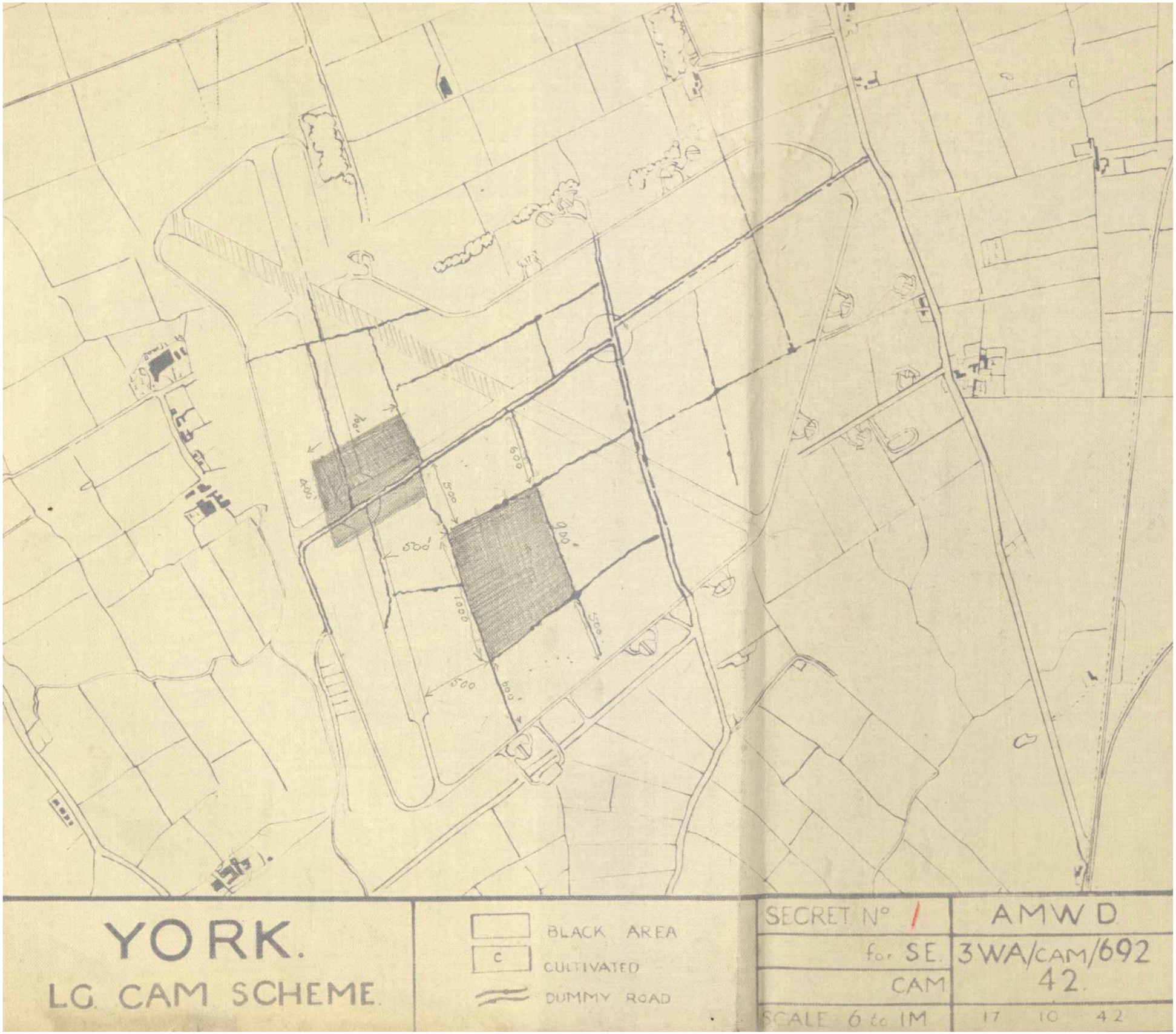
Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 7** Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Source: ERAO DDX 589/2.

Rev	Description	PM	Review	Date

Client
CITY OF YORK COUNCIL
PELL FRISCHMANN

Project
YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title
CLIFTON AIRFIELD CAMOFLAGE PLAN OCTOBER 1942

Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.
FIGURE 8

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

Client: CITY OF YORK COUNCIL

PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CLIFTON AIRFIELD AIR MINISTRY SITE PLAN
NOVEMBER 1945

Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 9** Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

RESTRICTED

SKELETON PLANTATION

DANGER BUILDINGS

INSET – WT. TRANSMITTING SITE

TECHNICAL AREA

MAP AREA

SICK QRS SITE

WAAF SITE

MESS SITE

SCALE OF FEET

SCHEDULE OF BUILDINGS

TECHNICAL SITE

MESS SITE

DISPERSED SITE No 1

SICK QUARTERS SITE

W/T TRANSMITTING SITE

WAAF SITE

YORK
LOCATION PLAN

YORK
RECORD SITE PLAN
ALL SITES RESTRICTED

Recn No 5939
45

RESTRICTED

Source: YCA Y/ORD/4/6/52.

Source: Airfield Research Group Forum.

Rev	Description	PM	Review	Date

Client
CITY OF YORK COUNCIL
PELL FRISCHMANN

Project
YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title
AERIAL PHOTOGRAPH 1951

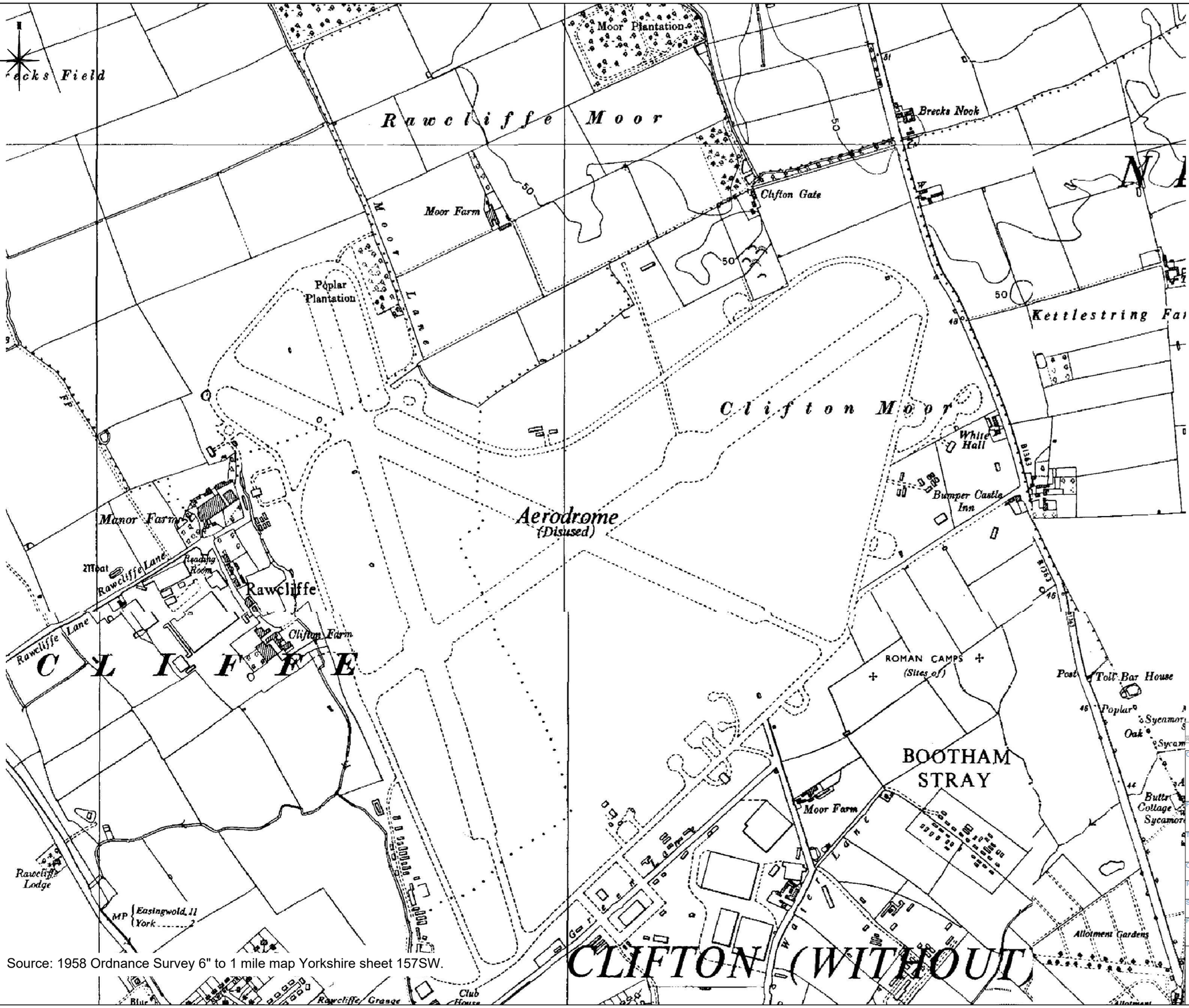
Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.
FIGURE 10
Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Source: 1958 Ordnance Survey 6" to 1 mile map Yorkshire sheet 157SW.

Rev	Description	PM	Review	Date

Client: PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CLIFTON AIRFIELD IN 1958

Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 11** Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

Source: Ordnance Survey 1:2500 scale map (*https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954*)

Rev	Description		PM	Review	Date

Client: PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: NORTH WEST PART OF
CLIFTON AIRFIELD IN 1967-68

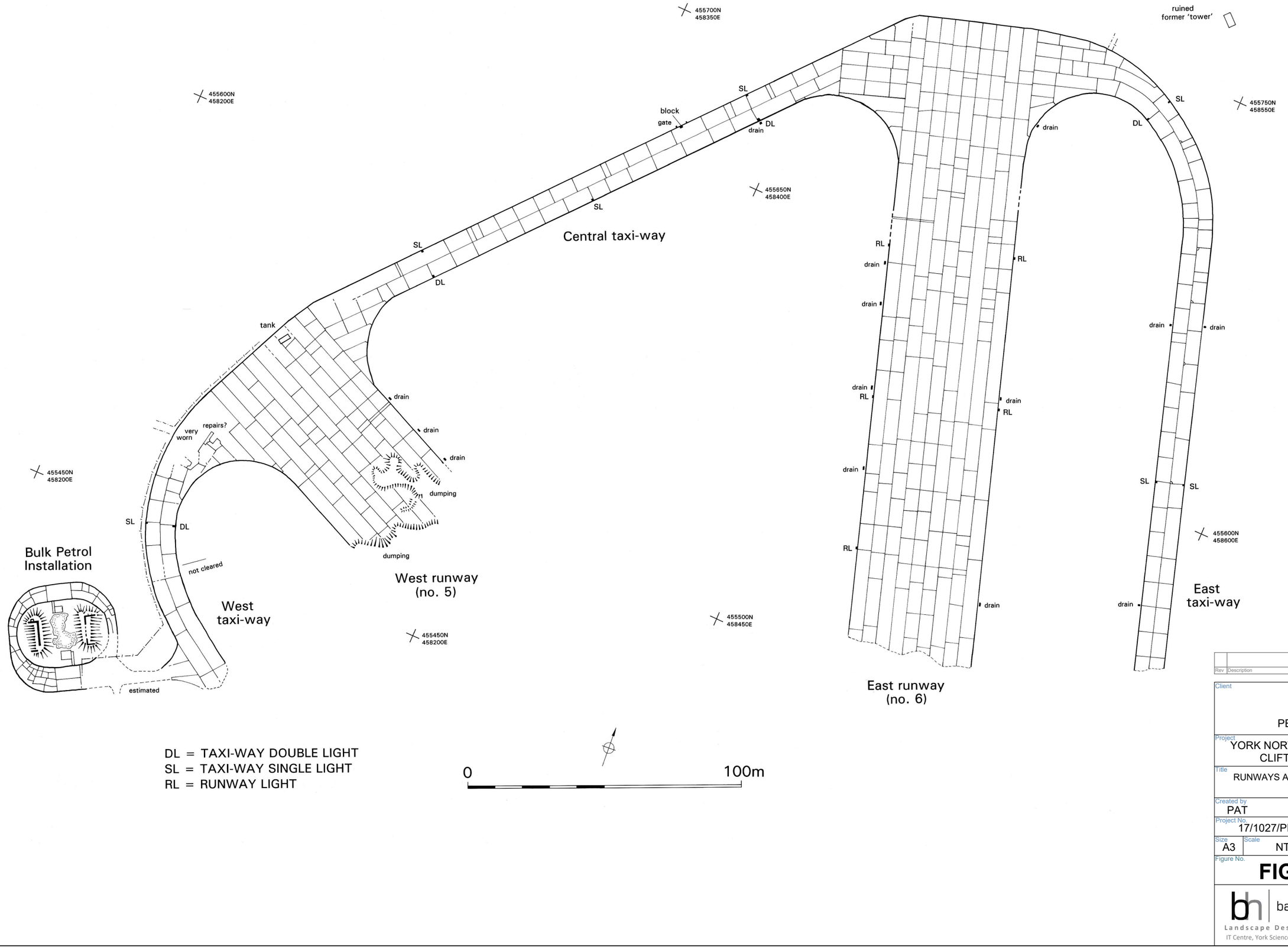
Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 12** Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



DL = TAXI-WAY DOUBLE LIGHT
SL = TAXI-WAY SINGLE LIGHT
RL = RUNWAY LIGHT

Rev	Description	PM	Review	Date

Client
CITY OF YORK COUNCIL
PELL FRISCHMANN

Project
YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title
RUNWAYS AND TAXI - WAYS SURVEY PLAN

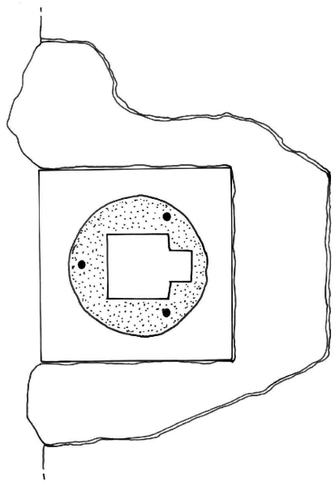
Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

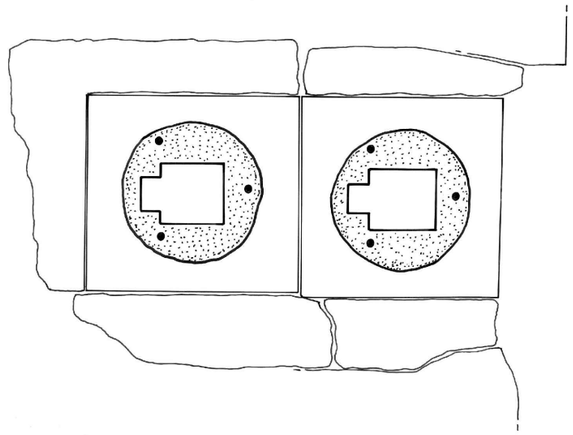
Size	Scale	Status
A3	NTS	FINAL

Figure No.
FIGURE 13
Rev

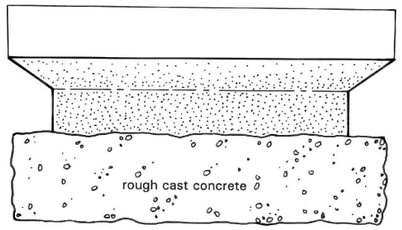
barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



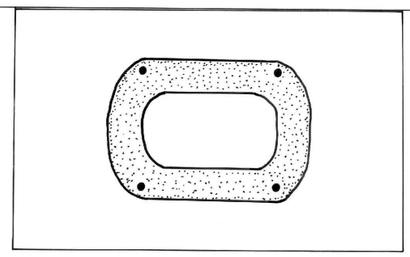
Typical taxi-way single light (plan)



Typical taxi-way double light (plan)



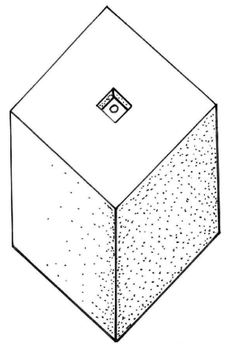
Section



Plan

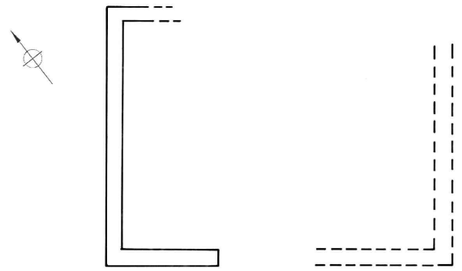
Typical runway landing light

0 1m



Concrete block

0 0.5m



Ruined former ‘tower’ (plan)

0 5m

Rev.	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL

PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: RUNWAYS LIGHTS AND OTHER DETAILS

Created by	Reviewer	Date
PAT	ED	03/20

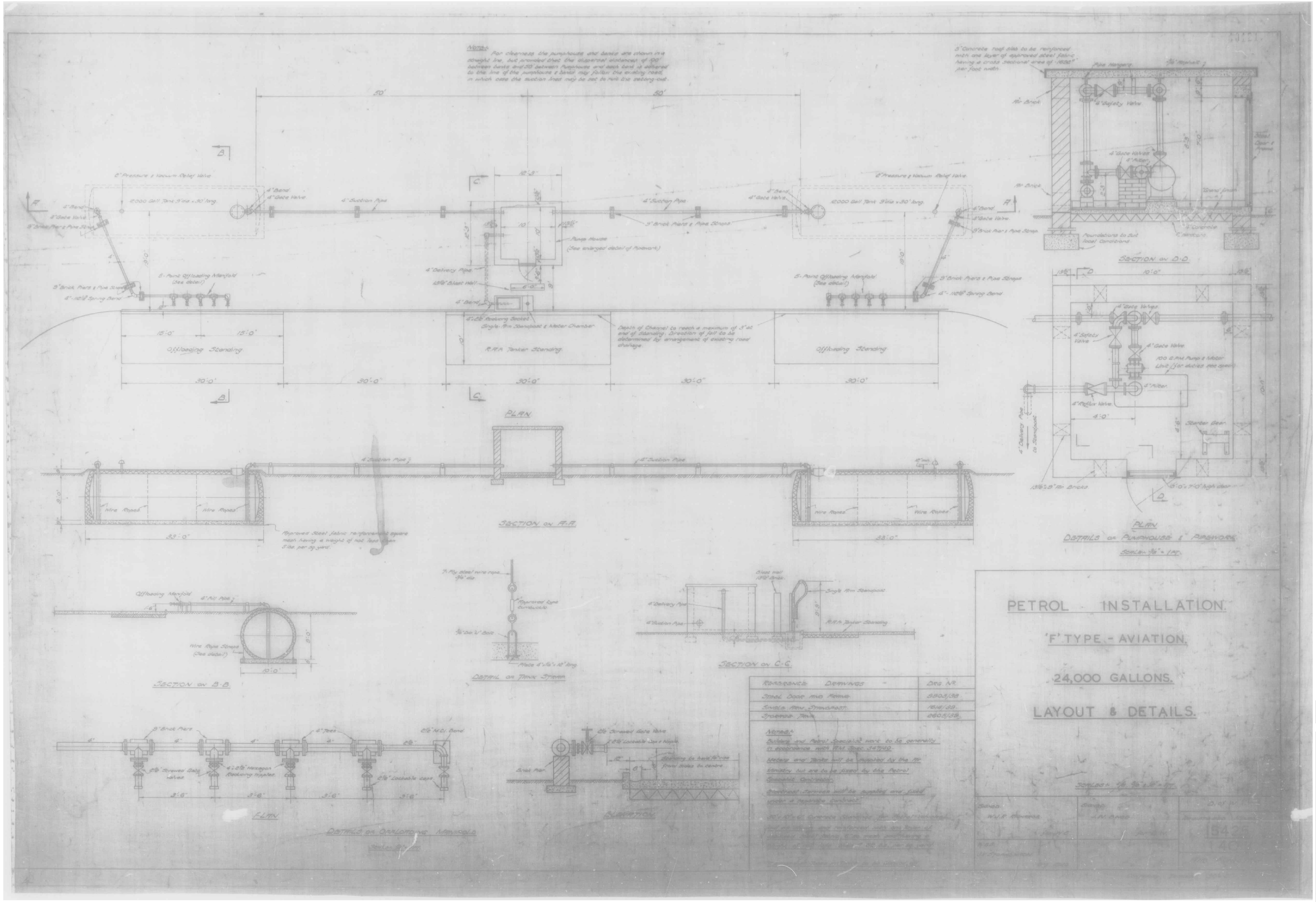
Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 14**

Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



REFERENCE DRAWINGS	DRG. No.
STEEL DOOR AND FRAME	3803/38
SINGLE ARM STANDPOST	1814/39
STORAGE TANK	2605/38

NOTES.
Builders and Petrol Specialist work to be generally in accordance with A.M. Spec. 347/40.
Meters and Tanks will be supplied by the Air Ministry but are to be fixed by the Petrol Specialist Contractor.
Electrical Services will be supplied and fixed under a separate Contract.

Rev	Description	PM	Review	Date

Client
CITY OF YORK COUNCIL
PELL FRISCHMANN

Project
YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title
BULK PETROL INSTALLATION
TYPE F DESIGN (1940)

Created by	Reviewer	Date
PAT	ED	03/20

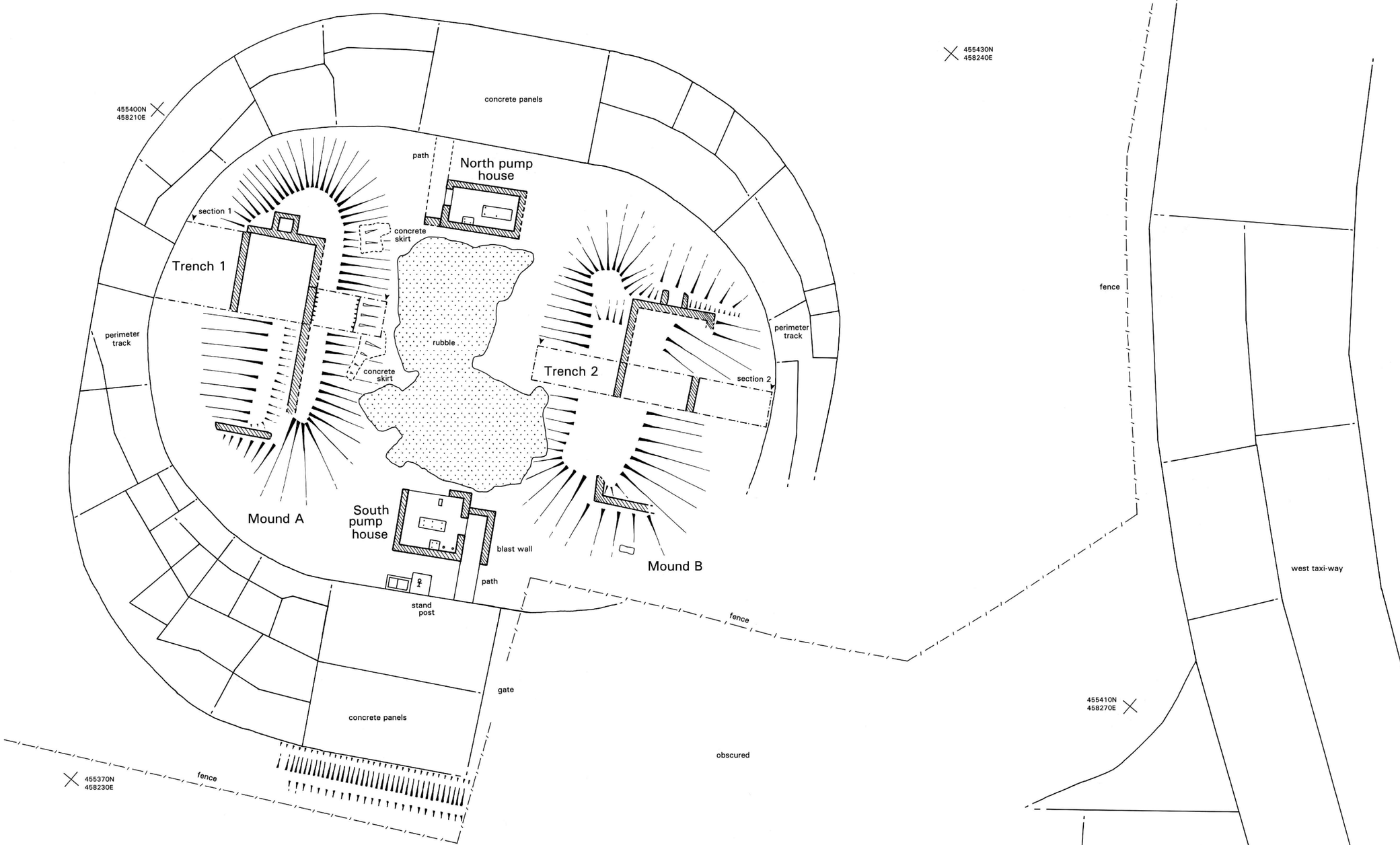
Project No. 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.
FIGURE 15
Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

Source: ©RAF Museum, Hendon 15425/40.



General trench plan

Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

BULK PETROL INSTALLATION
EXCAVATION PLAN

Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

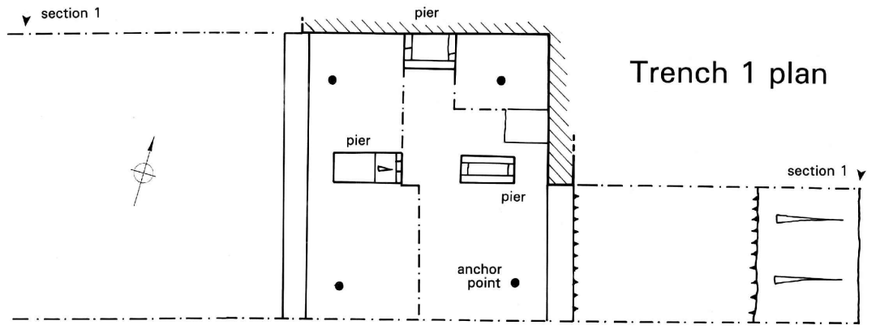
Size	Scale	Status
A3	NTS	FINAL

Figure No.

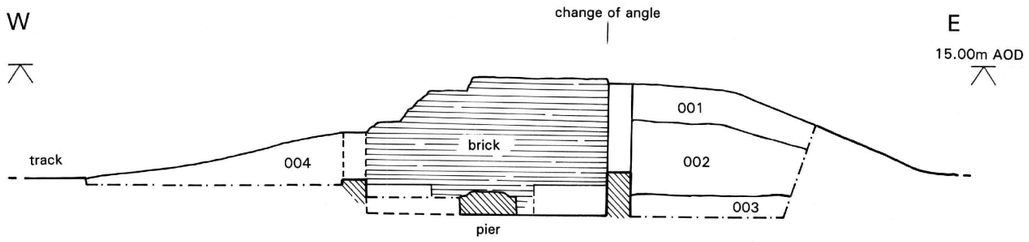
FIGURE 16

Rev

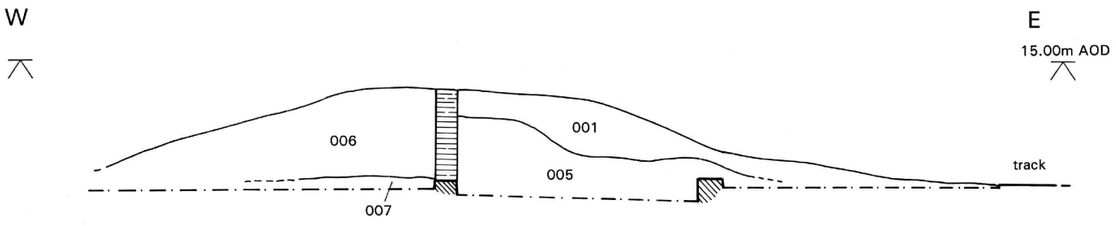
barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



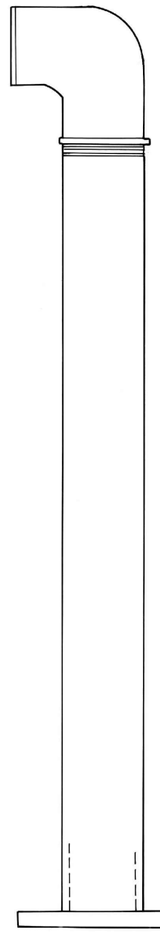
Trench 1 plan



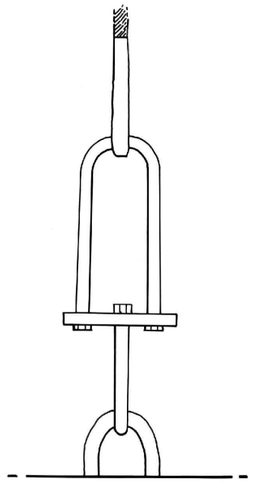
Section 1: North side of Trench 1



Section 2: North side of Trench 2



Typical section of pipe from Mound A



Stay for steel cable for tank in Trench 1

Rev	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL

PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: BULK PETROL INSTALLATION
EXCAVATION DETAILS

Created by	Reviewer	Date
PAT	ED	03/20

Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 17** Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

455780N
459120E

455780N
459200E

track

hedge

earth bank

retaining walls

sand and earth scarp

catch pit

shooting-in butts

sand and earth scarp

pillars

rubble

concrete base

firing shed

Cannon butts

concrete panels

'T-stand'

Machine gun butts

hedge and post-and-rail fence

General site plan

455700N
459120E

drain

455700N
459200E

0

30m

Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

CANNON BUTTS AND MACHINE GUN RANGE SURVEY PLAN

Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

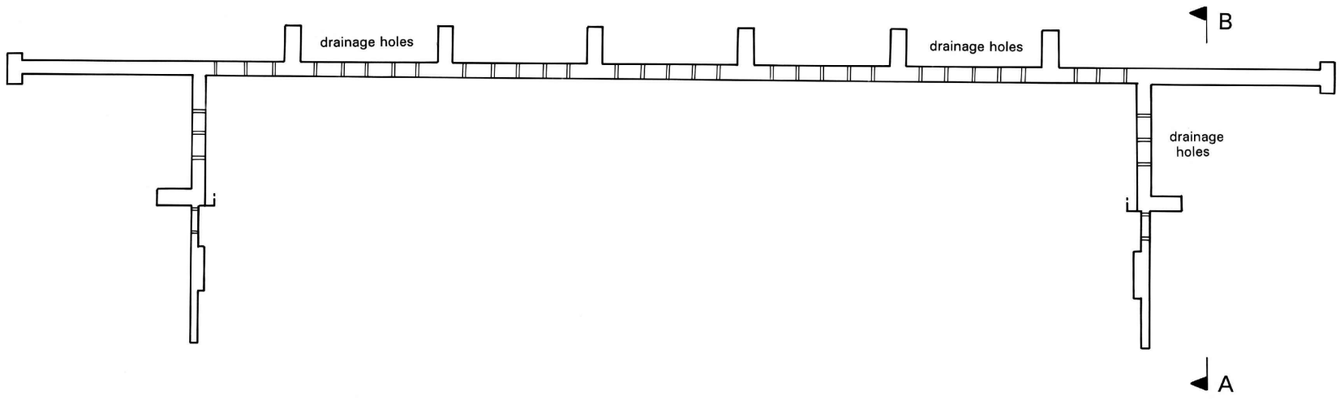
Size	Scale	Status
A3	NTS	FINAL

Figure No.

FIGURE 18

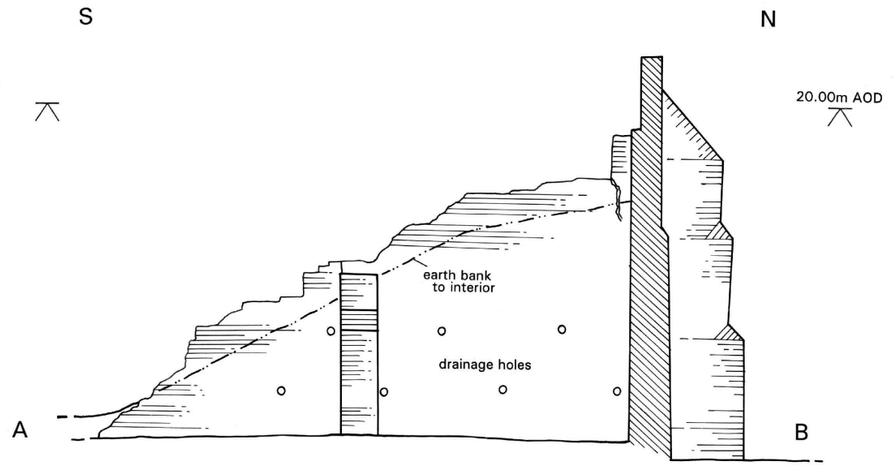
Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



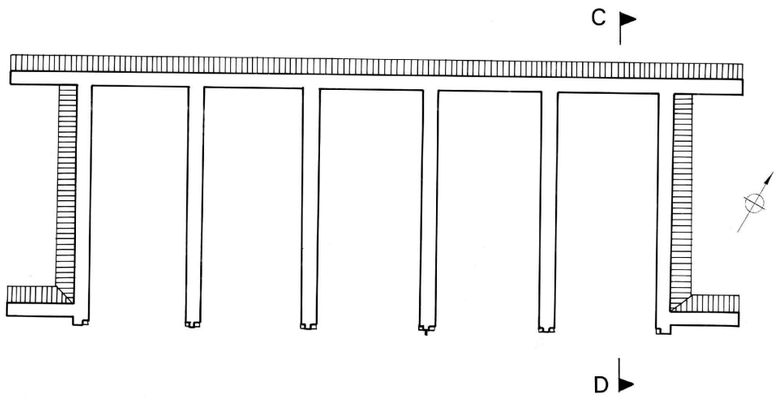
Machine gun butts retaining walls (plan)

0 15m

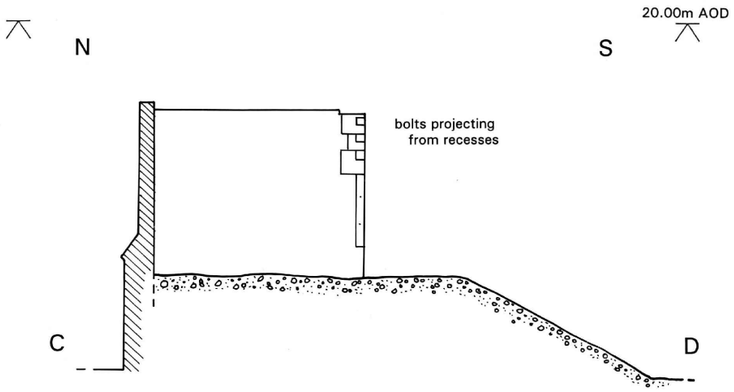


Machine gun butts section

0 10m



Cannon shooting-in butts (plan)



Cannon butts section

0 10m

Rev	Description	PM	Review	Date

Client: CITY OF YORK COUNCIL
PELL FRISCHMANN

Project: YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title: CANNON BUTTS AND MACHINE GUN RANGE SURVEY DETAILS

Created by	Reviewer	Date
PAT	ED	03/20

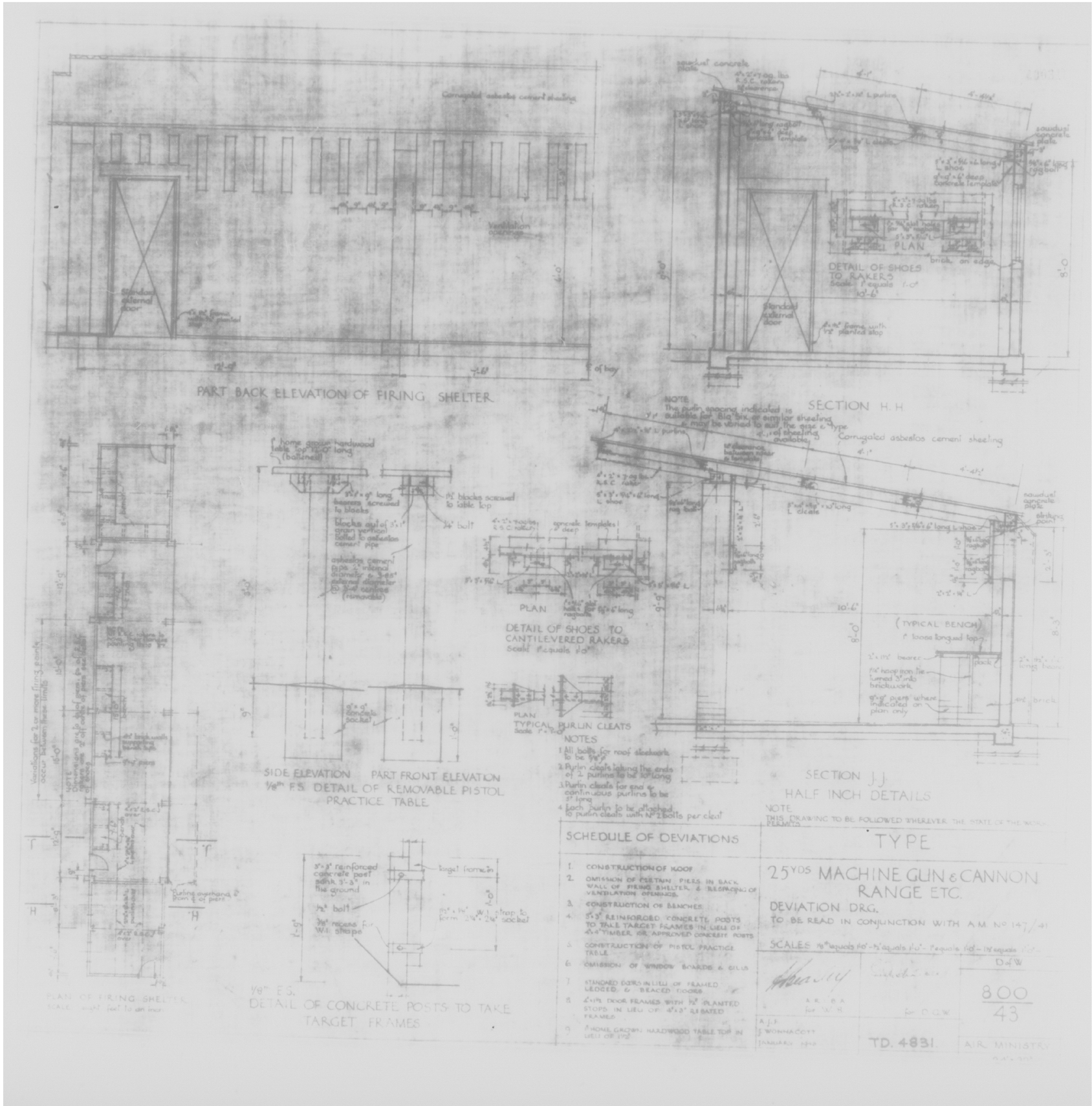
Project No.: 17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.: **FIGURE 19** Rev:

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

Source: © RAF Museum, Hendon 800/43 .



Rev	Description	PM	Review	Date

Client
PELL FRISCHMANN

Project
YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title
MACHINE GUN RANGE
FIRING SHED DESIGN (1940's)

Created by	Reviewer	Date
PAT	ED	03/20

Project No.
17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.
FIGURE 20
Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

APPENDICES

APPENDIX 1

Photographic Catalogue

Clifton Moor Airfield Survey - Photographic Catalogue

Film 1: Colour digital photographs taken 25th November 2019
Film 2: Colour digital photographs taken 26th November 2019
Film 3: Colour digital photographs taken 16th December 2019
Film 4: Colour digital photographs taken 4th February 2020

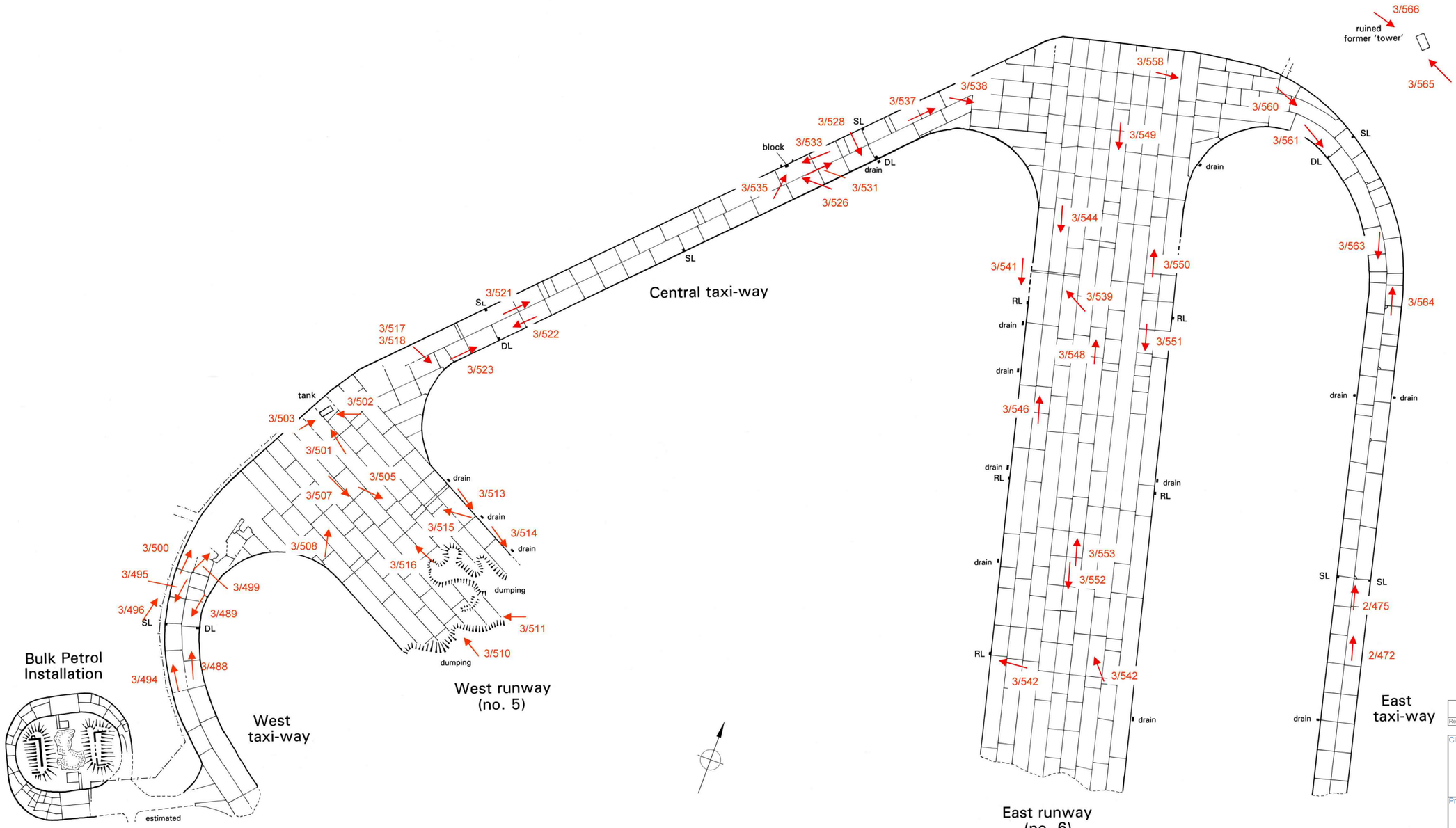
Film	*Frame*	*Subject*	*Scale*
1	405	Bulk petrol installation, mound A before excavation, looking E	-
1	406	Bulk petrol installation, mound A before excavation, looking W	-
1	407	Bulk petrol installation, mound A before excavation, looking E	-
1	408	Bulk petrol installation, general view of trench 2 showing brick walls of chamber, looking W	3 x 1m
1	409	Bulk petrol installation, general view of trench 2 showing brick walls of chamber, looking W	3 x 1m
1	410	Bulk petrol installation, general view of trench 2 showing brick walls of chamber, looking W	3 x 1m
1	411	Bulk petrol installation, trench 2 showing brick walls of chamber, looking W	3 x 1m
1	412	Bulk petrol installation, trench 2 showing brick walls of chamber, looking E	3 x 1m
1	413	Bulk petrol installation, trench 2 showing brick walls of chamber, looking E	3 x 1m
1	415	Bulk petrol installation, trench 2, wall in N-facing section, looking SE	1m
1	416	Bulk petrol installation, trench 2, wall in N-facing section, looking S	1m
1	417	Bulk petrol installation, trench 2, possible drain to W of E wall, looking E	1m
1	418	Bulk petrol installation, trench 2, chamber walls in N-facing section, looking SW	3 x 1m
1	419	Bulk petrol installation, trench 2 wall in N-facing section, looking SW	2 x 1m
1	420	Bulk petrol installation, trench 2, chamber walls in N-facing section, looking SE	2 x 1m
1	421	Bulk petrol installation, trench 2, wall in N-facing section, looking S	1m
1	422	Bulk petrol installation, trench 2, walls in S-facing section, looking NE	3 x 1m
1	423	Bulk petrol installation, trench 2, walls in S-facing section, looking NE	2 x 1m
1	424	Bulk petrol installation, trench 1, E end of N-facing section, looking W	1m
1	425	Bulk petrol installation, trench 1, E chamber wall, looking W	2 x 1m
1	426	Bulk petrol installation, trench 1, showing brick walls of chamber, looking W	2 x 1m
1	427	Bulk petrol installation, trench 1, E end of S-facing section, looking N	1m
1	428	Bulk petrol installation, trench 1, E end of N-facing section, looking S	1m
1	429	Bulk petrol installation, trench 1, E wall of chamber, looking W	1m
1	430	Bulk petrol installation, trench 1, *ex situ* fuel pipes, looking S	-
1	431	Bulk petrol installation, trench 1, excavated chamber, looking E	2 x 1m
1	432	Bulk petrol installation, trench 1, excavated chamber, looking E	2 x 1m
1	433	Bulk petrol installation, trench 1, excavated chamber, looking NE	2 x 1m
1	434	Bulk petrol installation, trench 1, floor of excavated chamber showing brick piers and anchor point, looking E	2 x 1m
1	435	Bulk petrol installation, trench 1, floor of excavated chamber showing brick piers and anchor point, looking N	2 x 1m
1	436	Bulk petrol installation, trench 1, N wall of excavated chamber showing brick piers and anchor point, looking N	2 x 1m
1	437	Bulk petrol installation, trench 1, E wall of excavated chamber, looking E	2 x 1m
1	438	Bulk petrol installation, trench 1, E wall of excavated chamber, looking E	2 x 1m
1	439	Bulk petrol installation, trench 1, detail of steel cable anchor, looking S	1m
1	440	Bulk petrol installation, trench 1, detail of steel cable anchor, looking S	-
1	441	Bulk petrol installation, trench 1, floor of excavated chamber showing brick piers and anchor point, looking N	1m
1	442	Bulk petrol installation, N pump house, looking SE	2 x 1m
1	443	Bulk petrol installation, N pump house, looking SE	2 x 1m
1	444	Bulk petrol installation, N pump house, looking NE	2 x 1m

1	445	Bulk petrol installation, N pump house, showing removed roof, looking NE	2 x 1m
1	446	Bulk petrol installation, N pump house, detail of pump and motor base, looking NE	1m
1	447	Bulk petrol installation, mound A, concrete skirt to E side, looking S	1m
1	448	Bulk petrol installation, S pump house, looking NE	2 x 1m
1	449	Bulk petrol installation, S pump house, looking NE	2 x 1m
1	450	Bulk petrol installation, S pump house, looking NW	2 x 1m
1	451	Bulk petrol installation, S pump house, looking NW	2 x 1m
1	452	Bulk petrol installation, S pump house, looking NW	2 x 1m
1	453	Bulk petrol installation, S pump house, concrete path and former blast wall, looking N	1m
1	455	Bulk petrol installation, S pump house, looking W	2 x 1m
1	456	Bulk petrol installation, S pump house and stand post, looking SE	2 x 1m
1	457	Bulk petrol installation, S pump house and stand post, looking SE	2 x 1m
2	458	Bulk petrol installation, trench 1, E wall of excavated chamber, looking E	1m
2	459	Bulk petrol installation, trench 1, E wall of excavated chamber, looking E	1m
2	460	Bulk petrol installation, trench 1, N wall of excavated chamber, looking N	1m
2	462	Bulk petrol installation, trench 1, detail of steel cable anchor, looking E	1m
2	464	Bulk petrol installation, S pump house and stand post, looking NW	1m
2	465	Bulk petrol installation, S pump house and stand post, looking NW	1m
2	466	Bulk petrol installation, S pump house and stand post, looking NW	1m
2	467	Bulk petrol installation, S pump house, looking NW	1m
2	468	Bulk petrol installation, S pump house, concrete path and former blast wall, looking N	1m
2	471	Bulk petrol installation, trench 1, *ex situ* fuel pipes, looking W	1m
2	472	East taxi-way, looking N	1m
2	475	East taxi-way, typical joint of 4 panels, looking N	1m
3	487	West taxi-way, excavated double taxi light, looking N	0.3m
3	488	West taxi-way, with excavated double taxi light, looking N	0.3m, 1m
3	489	West taxi-way, with excavated double taxi light, looking S	0.3m, 1m
3	490	West taxi-way, excavated double taxi light, looking S	0.3m
3	491	West taxi-way, excavated double taxi light, looking S	0.3m
3	492	West taxi-way, excavated single taxi light, looking N	0.3m
3	493	West taxi-way, excavated single taxi light, looking S	0.3m
3	494	West taxi-way, with excavated single taxi light, looking NE	0.3m, 1m
3	495	West taxi-way, with excavated single taxi light, looking SW	0.3m, 1m
3	496	West taxi-way, curve at NE end, looking NE	3 x 1m
3	499	West taxi-way, area of repair at NE end, looking NE	1m
3	500	West taxi-way, area of repair at NE end, looking N	1m
3	501	West runway, tank at N end, looking NW	1m
3	502	West runway, tank at N end, looking W	1m
3	503	West runway, tank at N end, looking E	1m
3	504	West runway, tank at N end, metal plate, looking E	1m
3	505	West runway, during clearance, looking SE	3 x 1m
3	507	West runway, during clearance, looking SE	3 x 1m
3	508	West runway, N end, looking N	3 x 1m
3	510	West runway, during clearance and showing dumped material, looking NW	3 x 1m
3	511	West runway, during clearance and showing dumped material, looking W	3 x 1m
3	512	West runway, E side, drain cover	1m
3	513	West runway, E side, drain cover, looking SE	1m
3	514	West runway, E side, drain, looking SE	1m
3	515	West runway, repair at N end, looking W	3 x 1m
3	516	West runway, typical joint of four panels, looking NW	2 x 1m

3	517	Central taxi-way, W end, showing typical joint to curving edge, looking SE	1m
3	518	Central taxi-way, W end, showing typical joint to curving edge, looking E	1m
3	521	Central taxi-way, looking NE	3 x 1m
3	522	Central taxi-way, W part, looking SW	3 x 1m
3	523	Central taxi-way, double taxi light, looking NE	1m
3	524	Central taxi-way, typical angle iron post to fence to N side, looking NE	1m
3	525	Central taxi-way, typical cable cover brick to fence to N side, looking N	0.3m
3	526	Central taxi-way, concrete block to fence to N side, looking W	1m
3	528	Central taxi-way, drain to S side, looking S	1m
3	529	Central taxi-way, drain to S side, looking SW	1m
3	531	Central taxi-way, E part, looking NE	3 x 1m
3	533	Central taxi-way, looking SW	3 x 1m
3	534	Central taxi-way, top of concrete block to N side, looking N	0.3m
3	535	Central taxi-way, concrete block to N side, looking NE	0.3m
3	537	Central taxi-way, junction of taxi-way and east runway, looking NE	3 x 1m
3	538	Central taxi-way, junction of taxi-way and east runway, looking SE	3 x 1m
3	539	East runway, W side of N end, repair?, looking NW	1m
3	540	East runway, W side, excavated runway light, looking W	0.3m
3	541	East runway, W side, excavated runway light, looking S	0.3m
3	542	East runway, W side, drain cover, looking W	0.3m
3	543	East runway, N end, numerals to concrete slab, looking S	0.3m
3	544	East runway, W side, looking SE	3 x 1m
3	546	East runway, W side, looking N	3 x 1m
3	548	East runway, looking N	3 x 1m
3	549	East runway, looking S	3 x 1m
3	550	East runway, N part, E side, looking N	2 x 1m
3	551	East runway, N part, E side, looking S	2 x 1m
3	552	East runway, S part, looking S	3 x 1m
3	553	East runway, S part, looking N	3 x 1m
3	555	East runway, W side, *ex situ* runway light, profile, looking W	0.3m
3	556	East runway, S part, looking N	3 x 1m
3	558	East taxi-way, NW end, looking E	3 x 1m
3	560	East taxi-way, NW end, looking SE	2 x 1m
3	561	East taxi-way, NW end, double lights, looking SE	1m
3	562	East taxi-way, NW end, double lights, cable detail, looking SE	-
3	563	East taxi-way, looking S	2 x 1m
3	564	East taxi-way, looking N	2 x 1m
3	565	Ruined structure, NW corner of Poplar Plantation, looking N	1m
3	566	Ruined structure, NW corner of Poplar Plantation, looking SE	1m
3	567	Ruined structure, NW corner of Poplar Plantation, metal fitting, looking N	-
3	577	Machine gun range, E end of butts wall, looking W	2 x 1m
3	582	Machine gun range, butts, looking NW	1m
3	583	Machine gun range, butts and catch pit, looking NW	-
3	585	Machine gun range, firing shed, surviving pier and wall remnant, looking S	1m
3	586	Machine gun range, E end of firing shed, looking NE	1m
3	590	Machine gun range, firing shed, concrete pad, looking NE	1m
3	591	Machine gun range, E end of firing shed, looking E	1m
3	602	Mound between machine gun range butts and cannon butts, looking NE	-
3	603	Cannon butts, bays to S side, looking E	1m
3	608	Cannon butts, detail to E'most bay to S side, looking E	-
3	610	Cannon butts, metal fittings to E end of S side, looking N	-
3	618	Drain, looking W	-
3	619	Drain, looking W	-

4	738	Machine gun range, butts, N elevation, looking SW	2 x 1m
4	739	Machine gun range, butts, N elevation, looking SW	2 x 1m
4	740	Machine gun range, butts, N elevation, looking SW	2 x 1m
4	741	Machine gun range, butts, N elevation, looking SW	2 x 1m
4	742	Machine gun range, butts, N elevation, looking SW	2 x 1m
4	743	Machine gun range, butts, N elevation, buttress detail, looking W	1m
4	744	Machine gun range, butts, N elevation, drainage pipe detail, looking SE	2 x 1m
4	745	Machine gun range, butts, N elevation, drainage pipe detail, looking SE	1m
4	746	Machine gun range, butts, N elevation, drainage pipe detail, looking SE	1m
4	747	Machine gun range, butts, N elevation, drainage pipe detail, looking SE	-
4	748	Machine gun range, butts, E end of S side, looking NW	2 x 1m
4	749	Machine gun range, butts, E end of S side, looking N	2 x 1m
4	750	Machine gun range, butts, E return wall, looking W	2 x 1m
4	751	Machine gun range, butts, E return wall, looking W	1m
4	753	Machine gun range, catch pit, looking SW	-
4	755	Machine gun range, butts and catch pit, looking NW	1m
4	758	Machine gun range, E end of firing shed, looking NE	1m
4	759	Machine gun range, E end of firing shed with view to butts, looking NW	1m
4	760	Machine gun range, E end of firing shed with view to butts, looking NW	1m
4	761	Machine gun range, firing shed, concrete pad, looking NE	1m
4	762	Machine gun range, firing shed, concrete pad, looking SW	1m
4	763	Machine gun range, butts and catch pit, looking NE	-
4	764	Machine gun range, butts and catch pit, looking NE	-
4	765	Machine gun range, butts, W return wall, looking N	2 x 1m
4	766	Machine gun range, butts, W return wall, looking NE	2 x 1m
4	767	Machine gun range, butts, W return wall, looking E	2 x 1m
4	768	Machine gun range, butts, W return wall, looking E	1m
4	769	Machine gun range, butts, W return wall, looking E	1m
4	771	Machine gun range, butts, W return wall, buttress detail, looking NW	1m
4	772	Machine gun range, butts, N elevation, looking E	1m
4	773	Machine gun range, butts, N elevation, looking E	1m
4	775	Mound between machine gun range butts and cannon butts, looking W	1m
4	776	Mound between machine gun range butts and cannon butts, looking NE	1m
4	777	Machine gun range, butts, W return wall, looking NE	1m
4	778	Cannon butts, E elevation, looking SW	1m
4	779	Cannon butts, S side, looking W	1m
4	780	Cannon butts, S side, looking N	1m
4	781	Cannon butts and hard standing, S side, looking NW	1m
4	782	Cannon butts, S side, looking NE	1m
4	783	Cannon butts & machine gun butts, looking NE	-
4	784	Cannon butts, detail of dividing wall to bays to S side, looking NW	1m
4	785	Cannon butts, detail of dividing wall to bays to S side, looking N	1m
4	786	Cannon butts, detail of bays to S side, looking W	1m
4	787	Cannon butts, detail of bays to N side, looking N	1m
4	788	Machine gun range, butts and catch pit, looking SE	-
4	789	Cannon butts, detail to E'most bay to S side, looking NE	1m
4	790	Cannon butts, detail to E'most bay to S side, looking N	1m
4	791	Machine gun range, butts, catch pit & firing shed, looking SE	-
4	792	Cannon butts, N elevation, looking SW	2 x 1m
4	793	Cannon butts, W elevation, looking NE	1m
4	794	Cannon butts, hard-standing, looking SE	2 x 1m
4	795	Cannon butts, hard-standing, looking SE	2 x 1m
4	796	Machine gun range, butts, W return wall, looking NW	1m
4	797	Machine gun range, butts, W return wall, buttress detail, looking SW	-

4	798	View to cannon butts and hard standing, looking SW	-
4	799	Machine gun range, catch pit & firing point, looking S	-
4	801	Machine gun range, butts, top wall to S side, looking W	1m
4	802	Machine gun range, butts, top wall to S side, looking E	1m
4	804	Machine gun range, catch pit & firing point, looking SW	-
4	805	Machine gun range, butts, E return wall, looking NE	1m



Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

RUNWAYS AND TAXI-WAYS
PHOTOGRAPHIC LOCATIONS

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

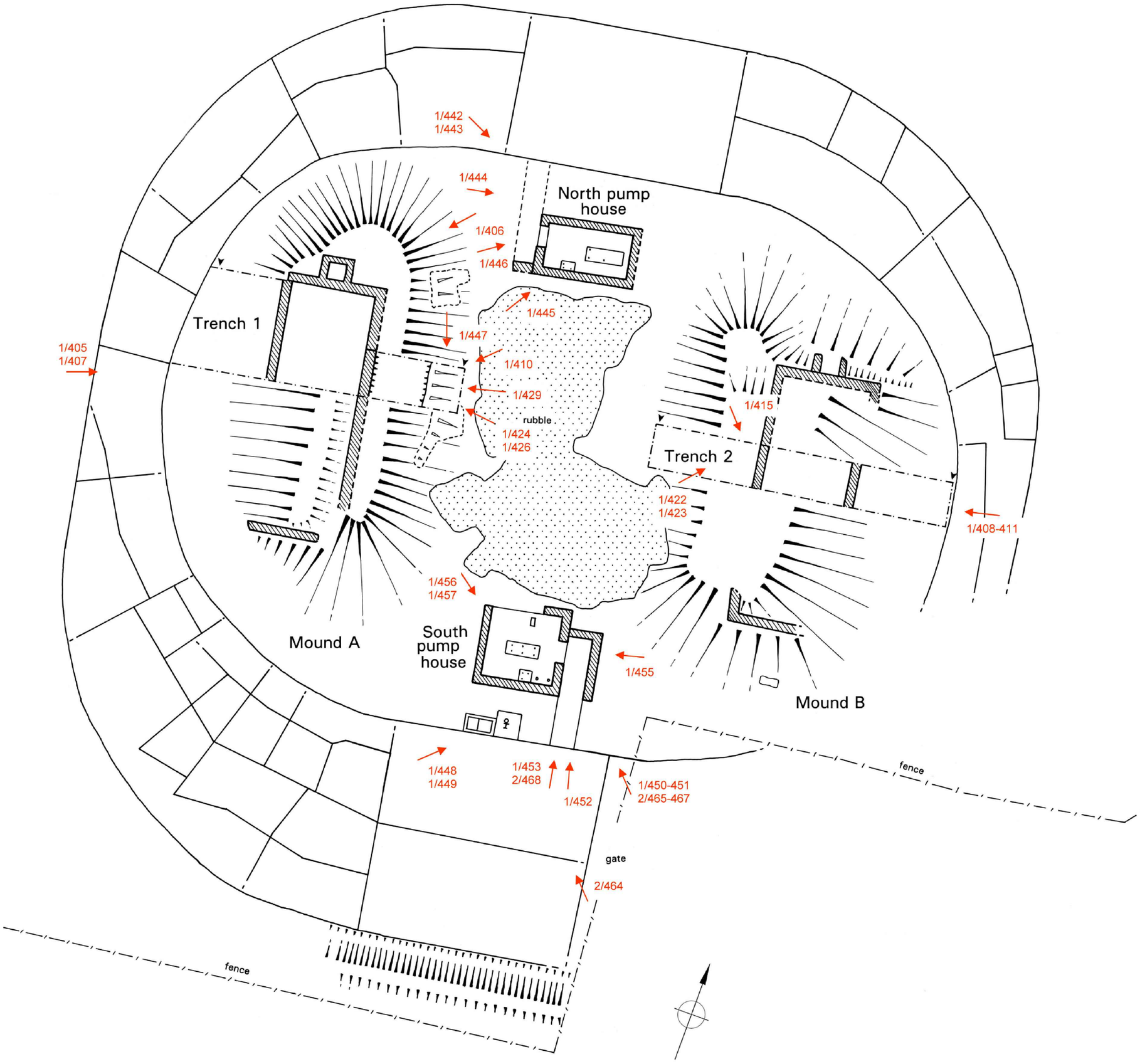
Size	Scale	Status
A3	NTS	FINAL

Figure No.

FIGURE 1A-1

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Internal trench photographs not shown

Rev.	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

BULK PETROL INSTALLATION
PHOTOGRAPHIC LOCATIONS

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

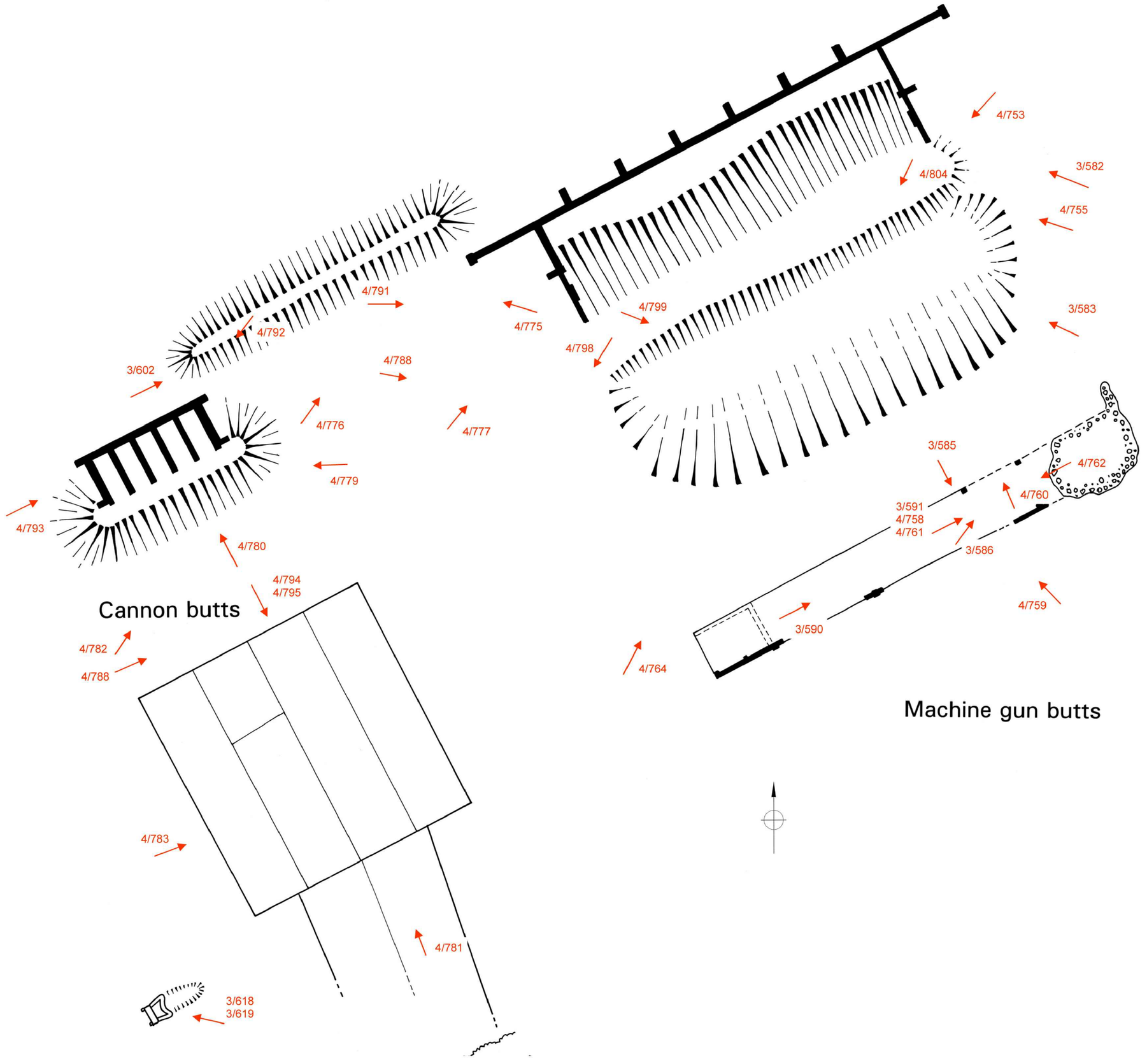
Size	Scale	Status
A3	NTS	FINAL

Figure No.

FIGURE 1A-2

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Rev	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

CANNON TESTING BUTTS AND MACHINE GUN RANGE PHOTOGRAPHIC LOCATIONS

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

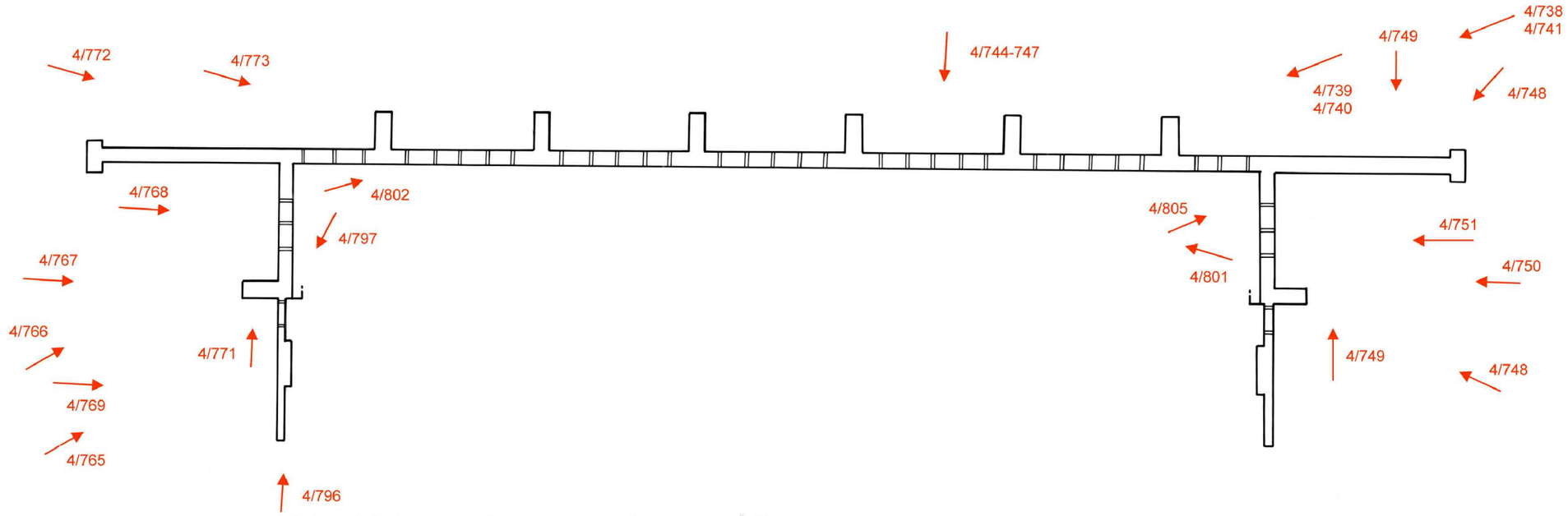
Size	Scale	Status
A3	NTS	FINAL

Figure No.

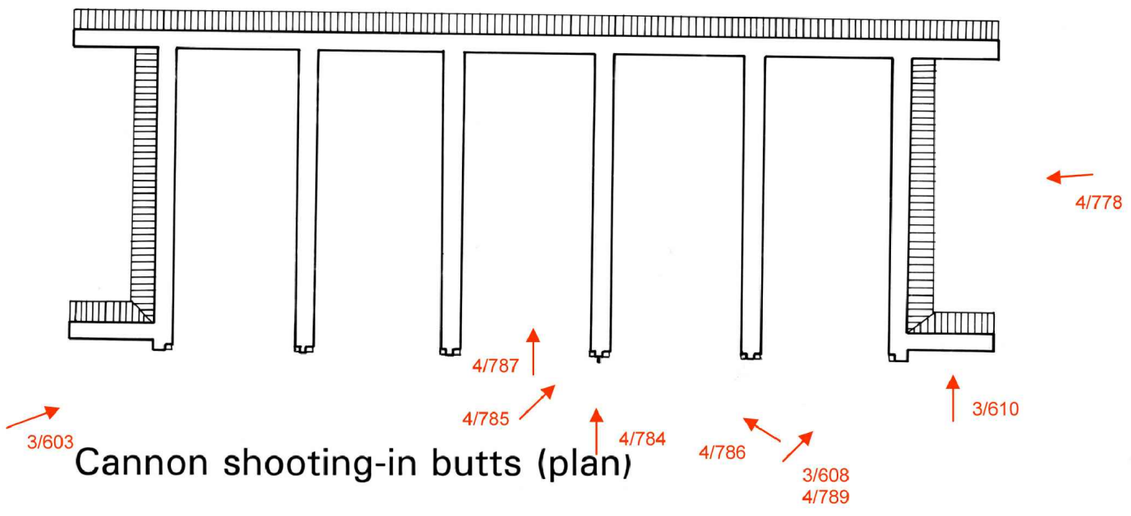
FIGURE 1A-3

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP



Machine gun butts retaining walls (plan)



Cannon shooting-in butts (plan)

Rev.	Description	PM	Review	Date

Client

CITY OF YORK COUNCIL

PELL FRISCHMANN

Project

YORK NORTHERN OUTER RING ROAD
CLIFTON MOOR JUNCTION

Title

CANNON TESTING BUTTS AND MACHINE GUN RANGE PHOTOGRAPHIC LOCATIONS

Created by	Reviewer	Date
PAT	ED	03/20

Project No.

17/1027/PFCL

Size	Scale	Status
A3	NTS	FINAL

Figure No.

FIGURE 1A-4

Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

APPENDIX 2

Written Scheme of Investigation

YORK NORTHERN OUTER RING ROAD (YNORR): DEMOLITION OF FORMER AIRFIELD STRUCTURES, CLIFTON MOOR, YORK

WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL INVESTIGATION AND RECORDING

Ed Dennison Archaeological Services Ltd
18 Springdale Way
Beverley
East Yorkshire
HU17 8NU

YORK NORTHERN OUTER RING ROAD (YNORR): DEMOLITION OF FORMER AIRFIELD STRUCTURES, CLIFTON MOOR, YORK

WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL INVESTIGATION AND RECORDING

1 INTRODUCTION

1.1 This Written Scheme of Investigation (WSI) details a programme of archaeological investigation and recording that will be undertaken on several structures associated with the former Clifton Moor airfield, Clifton Moor, York, prior to their demolition as part of proposed junction and other highway improvements (NGR SE 5906 5490 centred). This survey work forms part of a wider scheme of mitigation for the proposed road improvement scheme, which also includes archaeological excavation.

1.2 This written scheme has been produced by Ed Dennison Archaeological Services Ltd (EDAS), at the request of the City of York Council's City Archaeologist. The on-site fieldwork will be undertaken by EDAS, for Barton Howe Associates (BHA), on behalf of Pell Frischmann Consultants and City of York Council. The content of this WSI has been discussed and agreed with City of York Council's City Archaeologist.

2 SITE LOCATION AND DESCRIPTION

2.1 A total of three structures will be investigated and recorded, all lying on the north side of the existing A1237 road adjacent to the Clifton Moor roundabout. Described from west to east, these structures comprise the remains of a bulk petrol installation (NGR SE 58232 55401 centred), the remains of former airfield runways and taxi-ways (NGR SE 58454 55568 centred), and the remains of cannon testing butts and a machine gun range (NGR SE 59156 55746 centred) (see figure 1). All three sites were inspected in detail as part of a previous Cultural Heritage Simple Assessment Report, and the bulk petrol installation was subject to a pre-intervention earthwork survey in late February/early March 2019 (BHA 2019). None of the sites have any statutory protection.

Bulk Petrol Installation (see figures 2 and 3)

2.2 The site is shown on a 1945 plan of the airfield, numbered as '25b' and described as a 'Bulk Petrol Installation (24,000 gallons)' (York City Archives (YCA) Y/ORD/4/6/52). On the 1967-69 Ordnance Survey map, the site is again shown as being surrounded by an oval concrete roadway, itself linked to one of the perimeter taxi-ways. Within the area enclosed by the concrete roadway, there are short linear north-west/south-east aligned banks at the east and west sides, reinforced by walls. Between the banks, there are two small rectangular structures. The site escaped the extensive re-development of the rest of the airfield which took place during the 1980s, but was subsequently partially demolished at some point between 1988 and 2002. Fortunately, a number of photographs were taken in 1988 prior to this demolition, although these erroneously identify the site as gun butts (*http://www.controltowers.co.uk/C/Clifton.htm*). They show that each of the linear banks was open to the concrete roadway and incorporated a substantial brick wall to the other three sides. The walls appear to have been capped with concrete slabs. Each wall had a flight of nine or ten concrete steps rising to

the top of the south end, whilst a small square brick structure projected above the north end; these may possibly have had vents or openings to their south sides. Between the banks, the two small rectangular structures marked in 1967-69 can be seen. They were both brick-built, of a single storey, with flat concrete roofs - the southern structure had an entrance in the east elevation flanked by a screen wall, and the 1967-69 map shows the other was of the same plan. To the south of the south structure, there is a tall metal stanchion resembling a lamp post. The fact that the structures have flat concrete roofs dates them to post 1940, as earlier versions had pitched roofs (*Roger Thomas, Conflict Archaeologist, pers. comm.*). There is a standard design of a 24,000 gallon aviation petrol installation dating to the 1940s (15425/40), and this shows that two circular tanks, each 33 feet long and capable of holding 12,000 gallons, were buried below ground level. It may be that the Clifton Moor example is slightly different, perhaps due to the local ground conditions. Although now mostly demolished, the remains of the site are clearly visible on pre-2015 modern colour vertical aerial photography.

2.3 The remains of the bulk petrol installation are now represented by two elongated mounds, both aligned approximately north-south and containing exposed brickwork. The western mound measures 20.0m long by 9.5m wide while the eastern mound is 19.0m long by 11.5m wide. They are separated by an area of brick and concrete rubble representing the demolished remains of two small pump houses. To the south of the southern structure, a 4m high metal stanchion survives, which is probably the remains of pumping equipment. The site is surrounded by an oval concrete roadway, covering an area 40m square, which would have allowed road tankers to both bring fuel to the facility and to take fuel out to the waiting aeroplanes. The installation lies on the north-western edge of the former airfield, close to an perimeter taxi-way.

Airfield Runways and Taxi-ways

2.4 The site comprises the northern ends or thresholds of two of the former airfield's shorter runways (Nos 5 and 6), together with parts of their associated taxi-ways. Comparison of contemporary aerial photographs suggests that they were probably built in around June 1943. They are of sectional concrete construction covered with tarmac and/or bitumen; where the edges can be seen, the concrete panels have an average thickness of 0.10m. The majority of the surfaces are now badly overgrown with bushes and small trees.

2.5 The eastern taxi-way is aligned north-north-west/south-south-east, with a surviving length and width of c.210m and c.15m respectively. At its northern end, it curves around to the north-west to meet the north threshold of the eastern runway (No. 6). The surviving portion of this eastern runway is c.243m long by c.35m wide. A taxi-way leaves its northern end to run south-west to the north threshold of the western runway (No 5); the boundary fence along the north edge of the taxi-way retains barbed wire, wooden posts and angle-iron posts which are likely to date from the Second World War. The western runway (No. 5) is set on a north-west/south-east alignment, and the surviving northern portion is c.150m long by c.40m wide. At its north end, adjacent to the former boundary of the airfield there is a large cylindrical metal tank of unknown date and function. The western taxi-way leaves the north end of the western runway (No 5) and curves around to the south-west for some c.80m to pass close to the bulk petrol installation.

2.6 The areas between the runways and taxi-ways is now occupied by recently planted woodland, some of which has been planted using a 'ripping' technique which has resulted in significant rutting to the ground surface. On the east side of the site, an area of plantation lies between the eastern taxi-way and Moor Lane (Poplar Plantation); it is shown on an 1945 plan of the airfield and 1946 aerial photographs. A spread bank running parallel to the west side of Moor Lane may be of an earlier period, perhaps representing the remains of a medieval boundary separating one of Skelton's open fields (The Brecks) from the moor. Poplar Plantation now extends further to the south, up to the edge of the A1237 ring road, and this southern area has been identified as the possible location of an aircraft breaking area, used both during the war and in the immediate post-war period (Wenkel, Lang & Sainsbury 2018, 31-32).

2.7 On Ordnance Survey maps of 1967-69, an irregularly shaped raised-feature is shown in the north-east corner of Poplar Plantation, with a single small square structure to the south-west. A trackway links these features to the eastern surviving taxi-way described above. The irregularly-shaped area survives as a raised mound, from which a considerable amount of debris is either eroding or being brought up by rabbit burrowing. Some of this is clearly post-war dumping, although some of the pottery fragments bear 'NAAFI 1946' markings on the base suggest that there is also wartime and immediate post-war material here; an aerial photograph taken 10th May 1946 (Wenkel, Lang & Sainsbury 2018, 31-32) appears to show recently disturbed ground or dumping here. It seems likely that the mound was partly formed by clearance of on-site structures or dumping that had started by 1946, and which may have continued until at least 1967-69. Nevertheless, there may once have been wartime structures in this area, represented by shallow earthworks to the west of the mound, although nothing is shown in this area on the 1945 airfield plan. The only clearly surviving structure is that shown in 1967-69, which is represented by an L-shaped ruin, built of red machine-made bricks laid in a variation of English Garden Wall bond (three stretcher courses to each header course) set with cement mortar, with cement render to the external faces.

Cannon Testing Butts and Machine Gun Range (see figure 4)

2.8 The cannon butts and adjacent machine gun range are presently covered in dense scrub and located within a small area of woodland, although they remain clearly visible on pre-2015 modern colour vertical aerial photography. A square terminus of a taxi-way or roadway shown on 1967-69 Ordnance Survey maps survives, formed from concrete panels; the terminus is c.14m wide and runs to within 3m of the modern post and rail fence marking the north side of the A1237. There are some brick-lined pits or sumps in the woodland to the west which are probably also wartime structures. Some 20m to the north of the taxi-way/roadway terminus, there is a second brick wall with a bank to the southern side, essentially a smaller and simpler version of the longer structure seen at the machine gun range, but of very similar construction. The site is shown on the 1945 airfield plan as comprising a narrow rectangular structure at the north end, aligned almost east-west, with two conjoined rectangles to the south. It is numbered as '24', and labelled as 'NFE (night fighter equipment) Store'; this is an error, and it should be numbered '23' which the key identifies as 'Canon Test Butt' (YCA Y/ORD/4/6/52).

2.9 The main structural part of the machine gun range comprises a substantial brick wall, aligned north-east/south west and measuring c.40m long. It stands over 4m tall and appears to survive to its full height. It is built of light red

machine-made bricks laid in English Garden Wall bond set with a cement mortar. The north face has a chamfered inset set approximately half way up its height, and is supported by six stepped buttresses, each of three stages with tumbled-in brickwork. Below the inset, the wall is pierced by ceramic drainpipes which drain the bank to the south face (see below). At the top of the eastern end of the wall, metal fittings may once have secured a flagpole, used when live firing was taking place. The south face of the wall has a 2.50m high soil bank set against it, contained at the east and west ends by lower walls which are also buttressed. To the south, a large ditch shown in 1967-69 remains, being c.5m wide and up to 1.50m deep, with steeply scarped sides. A structure shown to the south of the ditch in 1945 and 1967-69 has largely been demolished, although several brick piers (the 'Posts' marked on the 1967-69 map) survive together with other footings amongst the dense vegetation. This would have formed a covered range from where the machine guns were fired at the butts to the north. The site is numbered as '22' on the 1945 airfield plan, and labelled as 'M.G. (machine gun) Range (6 Point)' (YCA Y/ORD/4/6/52).

3 HISTORY OF THE CLIFTON MOOR AIRFIELD

Introduction

3.1 A full account of the history and development of the Clifton Moor airfield has been given elsewhere (BHA 2019, 12-17), with the following giving a summary.

3.2 A civilian airfield first opened on the site in July 1936, after the land was bought by York Corporation in June 1934; the site actually covered 163 acres although only 60 acres were initially used. The airfield was to be officially called York Municipal Aerodrome, but its location gave rise to local references to Clifton or Rawcliffe, and it was later commonly known as Clifton airfield. At this time, the airfield had a single grass runway 600 yards long. A map of c.1938 shows that the infrastructure initially comprised a clubhouse and hangar in the south-corner of the site, with the main access being from Green Lane, close to its junction with Rawcliffe Lane. A second phase of expansion involved the building of a new hangar, a bungalow along Green Lane for the site manager, a new concrete apron and car park and an improved entrance. The airfield became a well-established centre for flying enthusiasts, and an air pageant held in June 1937 was viewed by some 10,000 spectators and attended by some 150 pilots from seven countries. However, day-to-day activity at the airfield was limited to club flying and an air taxi service.

3.3 The airfield was requisitioned by the RAF in September 1939. It was initially used as a 'scatter' site for bombers of the 51st and 58th Squadrons based at Linton-on-Ouse, but in December 1939 it was taken over and used by the 4th Army Co-operation Squadron, which was equipped with Westland Lysanders. Armstrong Whitworth also set up some repair and maintenance facilities at the site, for the Whitley bombers then in use on nearby airfields. By April 1940, a hutted camp had appeared around the old clubhouse and hangar in the south-west corner of the site, and for the first year it remained as a grass airfield. The site then became a Civilian Repair Unit (CRU) for the nearby airfields which used four engined Halifax bombers. The repair depot was first opened close to Rawcliffe village in July 1941, and was operated by Hadley Page Ltd. Demand for repair work meant that additional facilities were constructed on Water Lane and some 2,700 people were employed in the works. More than 2,000 Halifax bombers were repaired during the war, and mobile teams were

sent out from the airfield to repair the bombers at other locations. In 1941 other parts of the site were taken over by the 48th Maintenance Unit to repair and rebuild Halifax bombers, and extensive redevelopment took place. In order to accommodate the heavier aircraft, three concrete paved runways and 14 hangars were constructed, as well as accommodation for 500 personnel. The three runways formed a triangle shape, the longest (07/25), aligned north-east/south-west, being 4,800 ft long and the other two (13/31 and 17/35) being 600ft shorter. The control tower and a technical site were built close to Green Lane, and the domestic sites, sick quarters and other facilities were built in a dispersed manner stretching from Water Lane eastwards towards Bootham Stray.

3.4 The airfield was bombed and damaged during the 'Baedeker' raid of 28th-29th April 1942. Most of the bombing took place over the city, but the airfield guardroom received a direct hit, some hangars and the officers' mess were wrecked by blast damage, and some bombs also fell on the landing area. The 4th Army Co-operation Squadron continued to use the site, and in April 1942 some American single-seater fighter planes (Curtiss Tomahawks and Mustangs) arrived. It was presumably during this time that the 15 fighter-type open-air dispersal pens shown around the perimeter road on later maps were constructed. Several other Army Co-operation squadrons also came and went, including 809 Squadron of the Fleet Air Arm.

3.5 Between June 1943 and May 1945, the airfield was transferred to RAF Fighter Command, and it is assumed that they extended the runways again. The 48th Maintenance Unit also remained at the site, and it was also used by various Air Observer Post squadrons equipped with Auster Aircraft. By June 1944, the site had become the base of No 4 Aircraft Delivery Flight (ADF), using Dominie and Oxford aircraft, whilst in the same year No 430 Squadron of the Royal Canadian Air Force (RCAF), flying Mustang bombers, were present. The station strength in December 1944 comprised 503 personnel, of whom 119 were members of the Women's Auxiliary Air Force (WAAF).

3.6 An Air Ministry Record Site Plan made in November 1945 (YCA Y/ORD/4/6/52; see figure 5) shows the airfield in great detail, and includes a numbered key which identifies the different structures, buildings and areas shown. The three, by now extended, intersecting runways are clearly visible, with the domestic camps, including the Mess Site, the WAAF site and the Sick Quarters, concentrated around the southern edge of the airfield on Water Lane. The Ministry of Air Production (MAP) sites are shown at the end of Rawcliffe Lane, and off the north side of Water Lane. To the east, west and north sides of the runways, aircraft dispersal pens and Blister hangars are laid out in groups. An isolated group of structures marked as 'Danger Buildings' to the north of the airfield are almost certainly a bomb storage area, whilst the map also includes an inset depicting the WT Transmitting Site just to the south of Ings House. To the north, an isolated Robin Hanger on the edge of Skelton Plantation, well north of the airfield proper, was apparently used to fill shells with mustard gas.

3.7 After the war, between 1945 and 1948, the site was used by the 48th Maintenance Unit to dismantle over half of the remaining national Halifax bomber fleet, and hundreds of aircraft were stored on the airfield. The RAF left in 1946 but the airfield was not decommissioned, and was still used by Yorkshire Aviation Services for a short period. It then returned to civilian use, and a 1950s map shows that the site occupied the south-west part of the former military airfield.

3.8 The site closed in 1952. Most of the airfield infrastructure was destroyed in the 1980s when it was built over to provide housing and the Clifton Moor Retail Park. Some of the hangars to the south of the retail park survived as late as 2009, being used for grain storage, but were then demolished. A preliminary walkover survey carried out in October 2018 as part of the previously mentioned Simple Assessment Report (BHA 2019) showed that, apart from a small section of the east threshold of one of the runways close to the Wigginton Road, the only surviving parts of the airfield all lie to the north side of the A1237.

4 SURVEY METHODOLOGIES

Aims and Objectives

4.1 The aims and objectives of the project will be:

(1) to identify and objectively record all above-ground remains associated with the former airfield runways and taxi-ways, and the cannon butts and machine gun range, on the north side of the A1237 ring road, through a combination of non-intrusive survey work such as EDM and hand-held survey, photographic and descriptive techniques;

(2) to evaluate and assess the below-ground remains of the bulk petrol installation, through intrusive survey work involving the excavation of two or three machine-excavated archaeological trenches, together with hand-held survey, photographic and descriptive techniques;

(3) to described, analyse and interpret the remains of the three sites in terms of their specialist functions, and to place that analysis and interpretation into the wider context of the wartime airfield and other similar examples from other known locations;

(4) to produce appropriate recommendations for any further work required at the three sites, prior to their demolition and removal as part of the proposed road improvement scheme;

(5) to produce an ordered archive and report, and to place this in the public domain; the archive will be deposited with an appropriately registered museum (the Yorkshire Museum) and the Archaeology Data Service in York, and the report will be deposited with the City of York's Historic Environment Record.

General Comments

4.2 The scale and scope of the project will be determined by this WSI. The above-ground survey work will conform to a Level 3/4 survey, as outlined by Historic England (2007, 23-24; 2016, 26-27); a Level 3 survey produces an analytical record, while a Level 4 survey results in a comprehensive analytical record. The below-ground evaluation work will conform to all current established guidelines produced by Historic England (e.g. English Heritage 1991 & 2006a).

4.3 Additional standards and guidance published by the Chartered Institute for Archaeologists (CIfA), relating to the investigation and recording of standing buildings or structures, archaeological field evaluation, the collection,

documentation, conservation and research of archaeological materials, and the creation, compilation, transfer and deposition of archaeological archives, will be followed (CIfA 2014a-d). Other guidance produced by City of York Council for archaeological building recording and site evaluation will also be taken into account.

Documentary Research

4.4 No new documentary research will be undertaken as part of this stage of the works. The previously published Simple Assessment Report (BHA 2019) contains a considerable amount of information collected on both the airfield and the three sites subject to this phase of survey work. This includes the examination and collation of material held in local archives such as York City Archives, the Borthwick Institute at York University and the North Yorkshire County Record Office, and additional material has been obtained from the RAF Museum in Hendon, such as the original designs for standard airfield bulk petrol installations and machine gun ranges.

4.5 Information from the City of York Council's Historic Environment Record and Historic England's 'Heritage Gateway' database (which provides links to the National Heritage List for England, the National Record of the Historic Environment (Pastscape) and the National Monument Record Excavation Index) has also been collected and collated for the previous Simple Assessment Report.

Non-intrusive Archaeological Survey

4.6 As noted above, the former airfield runways and taxi-ways, and the cannon butts and machine gun range, will be subject to detailed non-intrusive archaeological surveys.

Vegetation Clearance

4.7 Prior to the start of any survey work, both sites will subject to intensive vegetation clearance to aid the identification of upstanding and above-ground remains. On the runways and taxi-ways, it is envisaged that machine-mounted flails and strimmers will be used to clear the vegetation (i.e. moss and low grass etc) from the flat surfaces, so that joints in the concrete panels are visible. Other small trees and brambles etc will be cut down to ground level. The cleared vegetation will be collected or blown into the edges of the adjoining plantation, so that surfaces and sight lines remain clear. The vegetation at the cannon butts and machine gun range is much more dense, with areas of thick brambles together with larger trees and shrubs. This will be cleared to ground level using a combination of machine-mounted flails and strimmers, with larger bushes and trees being felled. The aim will be to provide clear sight lines between and around upstanding remains, such that their arrangement and context are visible. Care would obviously taken to ensure that there was no damage to any upstanding structures during the clearance work, for example by tree felling. Cleared vegetation will be collected and placed in a non-archaeologically sensitive part of the site.

Measured and Drawn Survey: General Site Plans

4.8 An overall general ground level site plan will be produced for each site using EDM total station equipment. Sufficient information will be gathered to allow

the survey areas and sites to be readily located through the use of surviving structures, fences, walls, water courses, trackways and other topographical features. The survey will record the position at ground level of all structures, wall remnants and revetments, earthworks, water courses, paths, stone and rubble scatters, ironwork, fences, walls and other boundary features, and any other features considered to be of archaeological or historic interest. These EDM site surveys will pay particular attention to those specific structures that will be subject to more detailed recording, by providing a greater degree of detail such that accurate footprints can be produced.

4.9 Both site surveys will be produced as separate divorced surveys. They will be integrated into the Ordnance Survey national grid by resection to points of known co-ordinates. Heights AOD will be obtained by reference to the nearest OS benchmark; given the nature of the remains, contours will not be plotted across the site. Survey points would be taken from fixed survey stations on a closed traverse around and through the site. The locations, descriptions and values of the bench marks and control points will be stated in the final survey data.

4.10 On completion of the EDM total station survey, the field data will be plotted and re-checked on site in a separate operation. Any amendments or additions will be surveyed by hand measurement, and the results digitised back into the electronic survey data.

4.11 The resulting ground level site surveys will be produced at a scale of 1:500 for the runways/taxi-ways, and 1:100 scale for the cannon butts and machine gun range. They will be presented as interpretative hachure plans using conventions analogous to those used by Historic England/English Heritage (2007, 31-35). It is envisaged that the final survey drawings will comprise one or more A1 size sheets. It should be noted that the final product arising from the site surveys will be a series of hand-drawn wet ink hachure plans, although AutoCad (or equivalent) electronic data could also be provided if required. Larger scale plans, at 1:10,000 and 1:2,500 scale, will be used to put the survey areas into context.

Measured and Drawn Survey: Detailed Site Plans

4.12 Specific structures or areas of interest within the two sites, for example, the butt walls of the machine gun and cannon ranges, and the ruined structure in the north-east corner of the former airfield, will be drawn at a more detailed 1:50 scale. It may be that other structures worthy of this more detailed work may be revealed once vegetation clearance has been completed.

4.13 These ground-level plans would use the above EDM total station footprint survey as a base, although it is envisaged that more detailed hand measurement techniques will also need to be utilised. It should be stressed that only ground level plans will be produced; no elevations will be drawn, although they will be photographed (see below). The resulting drawings will show all significant detail such as openings (blocked or unblocked), inserted doorways, fittings, joist sockets etc. All drawings will be produced according to the guidelines established by Historic England (2016, 14), and will be keyed into the general site plans.

Photographic Survey

4.14 A general photographic record of the survey areas, and the features and structures within them, will be undertaken, in accordance with Historic England guidelines (2016, 17-21).

4.15 Photographs of specific structures will be taken, as far as is possible, at both a right angle and oblique to the external elevations, to show all external elevations and to record the overall impression of the structure's size and shape. Further external views will also be taken to reflect the original design and layout of the structure. The nature of the structures being recorded means that internal coverage is not required or applicable. All external or other detail, such as signage, structural or decorative items, graffiti etc will also be recorded. Finally, general views of the recorded structures, and the overall sites, will be taken to place them into context. Each photograph will normally be provided with a scale, and artificial lighting and tripods will be used where necessary, subject to practicalities and access.

4.16 An SLR digital camera with 12 mega-pixel resolution will be used, and Historic England guidelines in relation to digital image capture and file storage will be followed (Historic England 2015). All photographs will be clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and will be cross referenced to film and frame numbers. A photographic catalogue detailing the location and direction of each photograph will be completed, and the location and direction of each photograph will be noted on the relevant site and floor plan of the building.

4.17 All photographs will be taken in both RAW and jpeg formats - the latter will be used for illustrative purposes only, and will not form part of the site archive. The RAW photographs will be converted to an uncompressed 8-bit TIFF format for the purposes of the archive. Processed photographs will not be manipulated or altered prior to inclusion in the project archive.

Written Accounts

4.18 Sufficient notes will be taken on site in order to allow a detailed description of the larger areas or specific buildings/structures to be prepared, illustrated by the drawn and photographic records.

Intrusive Archaeological Investigation (see figure 6)

4.19 As noted above, the former bulk petrol installation will be subject to a limited programme of archaeological evaluation, through the excavation of three trial trenches. Two of these trenches will be excavated on an east-west alignment through the two linear mounds at the installation, with a view to confirming the presence or absence of any surviving fuel tanks; these trenches are estimated to be 12m long by 1.8m wide. Another shorter trench will be excavated through the site of the southern pump house to determine its survival and/or the presence of any below-ground pumping equipment. The ideal position of the three trenches is shown on figure 6, although it should be noted that on-site practicalities might require some slight re-positioning; the size and length of the trenches may also depend on the nature of any internal mound structures that are revealed.

On Site Excavation and Recording

4.20 The trenches will be opened using an appropriate mechanical excavator with a wide, toothless ditching blade or bucket, to reveal the internal structure of the mounds. The mechanical excavator will be under direct archaeological supervision at all times. Spoil will be positioned to one side of each trench so as to minimise land-take; there will be no differentiation of material.

4.21 After initial machining, and once structures are revealed, all excavation will be by hand, and will be limited to the cleaning of the machined surface(s) to expose any archaeological features in plan. A sufficient sample of exposed archaeological features and deposits will be excavated in an archaeologically controlled and stratigraphic manner, in order to achieve the aims of the evaluation. In some cases it may be appropriate to use the mechanical excavator to remove deep intrusions (e.g. modern brick or other debris). It is possible that excavated trenches may exceed 1.2m in depth, in which case they will be widened to allow some stepping in to facilitate safe access for recording purposes.

4.22 The mechanical excavator will also be used to remove existing rubble from key parts of the site, for example around both the northern and southern pump houses, and also around brick walls and possible stepped access ways at the northern ends of the two mounds.

4.23 A full written, drawn and photographic record will be made of all material and features revealed during the course of the evaluation. All excavated archaeological contexts will be recorded by detailed written records giving details of location, composition, shape, dimensions, relationships, finds, samples, and cross-references to other elements of the record and other relevant contexts, in accordance with best industry practice and current recording guidelines. Fieldwork records will be indexed, ordered, quantified, and checked for consistency. The position of each trench will be plotted on the existing pre-intervention plan (see figure **), which will also be updated with any new information revealed as a result of the rubble clearance. More detailed plans and sections of excavated or exposed features will be recorded at a scales of 1:50, 1:20 and/or 1:10 as appropriate. A full digital photographic record will be kept (minimum 12 megapixel resolution), in both RAW and jpeg formats, and this will record individual exposed features and structures, as well as providing more general shots of the site and the excavations.

4.24 All trenches will be backfilled and reinstated immediately after excavation and recording have been completed, to avoid unauthorised public access. The site will be left in a tidy and clean state on completion of the fieldwork programme.

Finds Recovery and Sampling Strategy

4.25 Any finds (artefacts and ecofacts) recovered during the archaeological evaluation will be collected. However, finds which are unstratified or from the topsoil or modern overburden will generally not be retained for assessment (subject to the agreement of the relevant specialists), unless they are of particular significance.

4.26 A finds recovery and conservation strategy will be agreed prior to the start of any work, in accordance with regional and national guidelines (e.g. Society of Museum Archaeologists 1993; UKIC 2001). All artefacts will be washed

(unless their condition makes this inappropriate) and marked in a manner agreed with the recipient museum (any recording, marking and storage materials will be of archival quality), and recording systems will be compatible with the recipient museum. Once collected, all artefacts will be conserved as necessary (see below), stored and processed in accordance with standard methodologies and national guidelines on the appropriate materials and in conditions to ensure that minimal deterioration takes place (Watkinson & Neal 1998). If necessary, a conservator will provide "first aid" conservation treatment, to ensure that objects do not deteriorate once removed from the ground.

4.27 Given the nature of the site being excavated, it is not envisaged that large numbers of finds or artefacts will be recovered, and that no human remains will be uncovered. It is also envisaged that there will be no requirement for any programme of scientific analysis (for example the analysis of paint, mortar, stucco, etc and/or dendrochronological dating of timbers, radiocarbon dating etc), nor for any programme of soil sampling leading to the recovery of carbonised and waterlogged remains, vertebrate remains, molluscs and small artefactual material.

4.28 However, if, in the professional judgement of the archaeologist on site, unexpectedly significant or complex discoveries are made that warrant more recording than is covered by this WSI, immediate contact will be made with the local archaeological curators. This will allow appropriate amendments to be made to the scope of the recording work, in agreement with all parties concerned; these amendments might, for example, include the requirement to sample archaeological and/or environmental deposits, and/or detailed excavation of specific structures. Advice from appropriate specialists, and the Historic England Regional Science Advisor would also be taken as necessary.

4.29 On completion of the archaeological fieldwork, any samples taken will be processed and any finds will be cleaned, identified, assessed, spot dated, marked (if appropriate), and properly packaged and stored in accordance with the requirements of national guidelines. The level of any post-excavation analysis will be appropriate to the quality and quantity of the finds recovered, and specialists would be consulted as necessary.

Modifications

4.30 The programme of recording work outlined above may be modified in accordance with the professional judgement of the staff undertaking the work, insofar as the overall provisions and objectives of this WSI would not be changed. Any variations in the project would be discussed and agreed in advance with the City of York Council's City Archaeologist.

5 REPORTING

5.1 Within ten weeks of the completion of all the site work (or longer if agreed with relevant parties), a detailed survey archive report detailing the results of the fieldwork will be produced. This report will be produced by Barton Howe Associates, and will include the following (as appropriate):

- a contents list, with lists of plates and figures;
- a non-technical summary;

- site code/project number;
- dates of fieldwork visits;
- national grid reference;
- a brief account of the project plan, aims and objectives, survey methodology, procedures and equipment used;
- a summary of the historical and archaeological background to the recorded sites;
- the results of the archaeological fieldwork, and an account of the recorded sites overall form and development, and of the evidence supporting any interpretation - this might include references to any structural and stratigraphic sequences established by the excavations, including phasing of the site sequence and spot-dating of the ceramics, with reference to the local and regional archaeological contexts;
- where appropriate, catalogues and summary records, accounts and descriptions of each artefactual and ecofactual assemblage recovered from the investigations, supported by illustration and specialist reports as necessary - any individual specialist reports will contain non-technical summaries and tabulation of data in relation to the site phasing contexts, and will be presented as unedited appendices to the main report;
- conclusions, including an assessment of the importance of the recorded sites in relation to any other remains in the general area as a whole;
- recommendations for any further analysis/work relating to the recorded finds;
- a bibliography and list of sources consulted;
- site location plans, with scales;
- survey plans and section drawings, showing ground level, Ordnance Datum and vertical and horizontal scales;
- copies of the colour digital photographs, printed at 600dpi;
- copies of any historic maps, drawings, photographs etc which would be relevant to illustrate the development of the recorded sites and the area in general;
- selected illustrative material, including general site photographs and photographs of any significant features that are encountered (a maximum of two plates per A4 sheet);
- appendices containing a copy of this WSI, together with the details of any departures from that design, and any various survey data and photographic registers and catalogues, and a copy of the relevant OASIS data collection form;

- acknowledgements.

Appropriate drawn records would be produced as reduced A4 or A3 size paper copies within the body of the report; full scale drawings would be included within the site archive.

5.2 A draft copy of the final report will be supplied to interested parties as directed. Comments and suggestions would be incorporated into the final version of the report as appropriate.

5.3 The approved final BHA report will be distributed to the client and other interested parties and the City of York Council's Historic Environment Record (as a pdf file).

6 ARCHIVE

6.1 Once the on-site fieldwork and subsequent reporting is complete, a fully indexed field archive would be prepared, following the guidance produced by Historic England and others (e.g. Brown 2011, CIfA 2014b, UKIC 1983 & 1984).

6.2 Unless further archaeological fieldwork is required (e.g. as part of the road construction programme, or if further post-excavation analysis is required on any recovered artefacts or other material), the archive would be deposited with York Museum within 150 working days. All deposition guidelines would be followed and EDAS/BHA would adhere to any donation requirements which the museum might impose, for example for the storage and long-term curation of the site archive.

6.3 The archive will comprise primary written documents, plans, sections and photographs, a hard copy of the final report, and an index to the archive. All material within the archive will be stored in archival-stable material. All material originally created in digital form (e.g. photographs) will be collated and prepared for deposition with the Archaeology Data Service in York. Again, their requirements relating to file formats and associated catalogues would be followed, as well as their requirement for deposition charges.

7 OTHER RELEVANT INFORMATION

Monitoring

7.1 It is assumed that the archaeological recording work will be monitored by the City of York Council's City Archaeologist. EDAS would give a minimum of two week's notice of the commencement of site work so that arrangements for monitoring can be made as appropriate.

Health and Safety

7.2 It is possible that all three sites subject to the archaeological recording will have health and safety issues, particularly the cannon butts and machine gun range. All site recording work will therefore be carried out with due regard for all health and safety considerations, and health and safety will take priority over survey matters. EDAS would comply with the Health and Safety at Work Act of 1974 while undertaking the work, and a Risk Assessment would be

produced in advance of any site work. It might also be necessary to attend a "tool-box" talk regarding the potential for unexploded ordnance and other dangerous site conditions.

7.3 Necessary precautions should be taken regarding any underground services and overhead lines. Existing knowledge of the site means that the use of shoring for deep excavations, pumps and artificial lighting is unlikely to be required.

7.4 The sites are privately owned and EDAS would indemnify the landowner in respect of their legal liability for physical injury to persons or damage to property arising on site in connection with the recording brief, to the extent of EDAS's Public Liability Insurance Cover (£5,000,000).

Community Engagement

7.5 The contribution of archaeology to public benefit through community engagement is recognised in the City of York's planning policy framework. In some cases, it is possible that some community engagement can take place during archaeological work. However, in this particular instance, it is not considered that this will be possible, especially given the relatively short period of the on-site fieldwork.

Online Access to Index of Archaeological Investigations

7.6 EDAS also subscribe to Historic England's OASIS (Online Access to Index of Archaeological Investigations) project, and all EDAS projects are fully OASIS compliant. Prior to the start of the fieldwork, an OASIS online record will be initiated and key fields completed on Details, Location and Creators forms. All parts of the OASIS online form will subsequently be completed for submission to Historic England and the City of York Council's Historic Environment Record. This will include an uploaded pdf version of the entire report.

Intellectual Property Rights

7.7 The owner(s) of the Intellectual Property Rights (IPR) in the information and documentation arising from the project would grant a licence to the City of York Council and the Yorkshire Museum accepting the archive to use such documentation for their statutory functions and provide copies to third parties as an incidental to such functions. Under the Environmental Information Regulations (EIR), such documentation is required to be made available to enquirers if it meets the test of public interest. Any information disclosure issues would be resolved between the Client and the Archaeological Contractor before completion of the work. It should be noted that EIR requirements do not affect IPR.

8 BIBLIOGRAPHY

BHA (Barton Howe Associates) 2019 *York Northern Outer Ring Road: Clifton Moor Junction: Cultural Heritage Simple Assessment Report* (unpublished report for City of York Council)

Brown, D H 2011 *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation* (Archaeological Archives Forum)

CIfA (Chartered Institute for Archaeologists) 2014d *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials*

CIfA (Chartered Institute for Archaeologists) 2014c *Standard and Guidance for Archaeological Field Evaluation*

CIfA (Chartered Institute for Archaeologists) 2014b *Standard and guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*

CIfA (Chartered Institute for Archaeologists) 2014a *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures*

English Heritage 2007 *Understanding the Archaeology of Landscapes: a Guide to Good Recording Practice*

English Heritage 2006a *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide*

English Heritage 1991 *The Management of Archaeological Projects*

Historic England 2016 *Understanding Historic Buildings: a Guide to Good Recording Practice*

Historic England 2015 *Digital Image Capture and File Storage: Guidelines for Best Practice*

Society of Museum Archaeologists 1993 *Selection, Retention and Dispersal of Archaeological Collections: Guidelines for use in England, Northern Ireland, Scotland and Wales*

UKIC (United Kingdom Institute for Conservation) 2001 *Excavated Artefacts and Conservation* (UKIC Guideline No 1)

UKIC (United Kingdom Institute for Conservation) 1984 *Environmental Standards for Permanent Storage of Excavated Material from Archaeological Sites* (UKIC Guideline No 3)

UKIC (United Kingdom Institute for Conservation) 1983 *Packaging and Storage of Freshly Excavated Artefacts from Archaeological Sites* (UKIC Guideline No 2)

Watkinson, D & Neal, V 1998 *First Aid for Finds* (3rd edition)

Wenkel, M, Lang, S & Sainsbury, M 2018 *Clifton Moor UXO Desk Study & Risk Assessment* (unpublished Zeticauxo report for Pell Frischmann)

Ed Dennison, EDAS
20th October 2019

PROJECT	
CLIFTON MOOR AIRFIELD	
TITLE	
AREAS OF SURVEY	
SCALE: AS SHOWN	DATE: OCT 2019
EDAS	FIGURE: 1

Area of airfield survey

Cannon butts and machine gun range

Bulk Petrol Installation

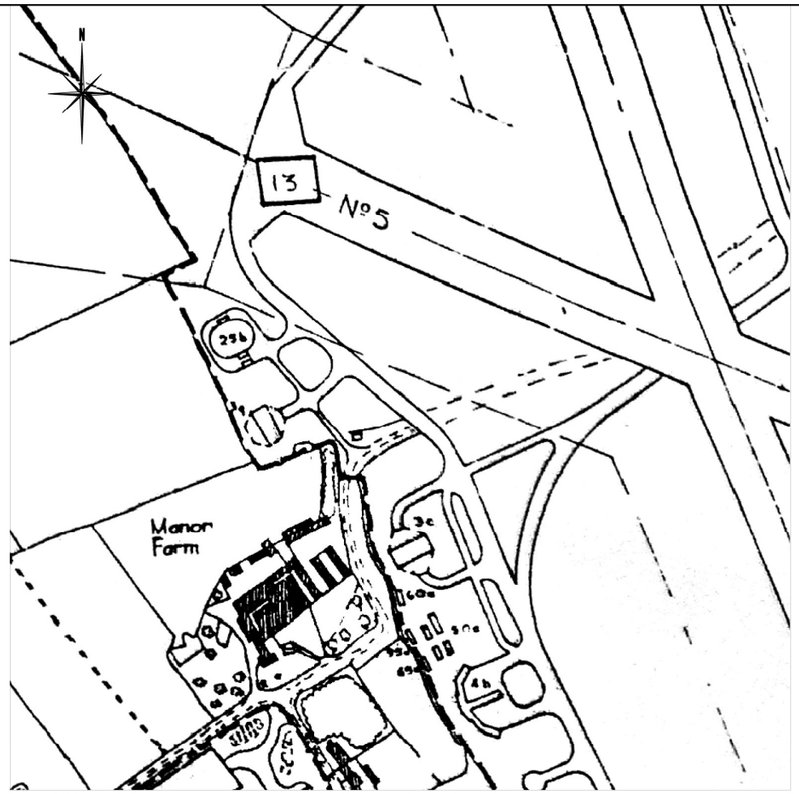
CLIFTON MOOR RETAIL PARK

RAWCLIFFE

LEGEND

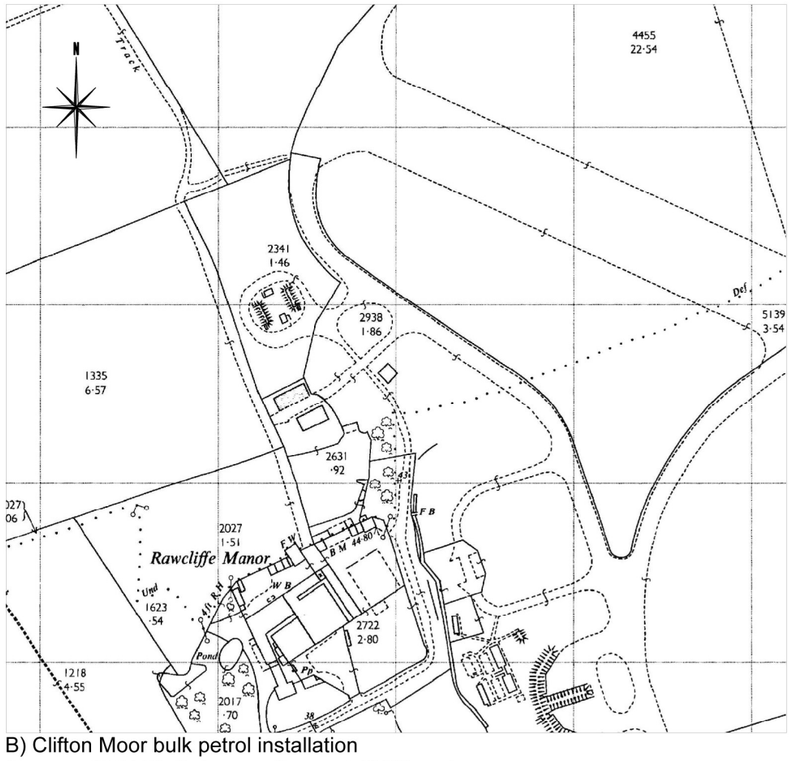
Extent of Highway works

0 10 50 100 metres



A) Clifton Moor bulk petrol installation (no. 25b)
(source: 1945 Air Ministry plan, YCA Y/ORD/4/6/52).

C) Clifton Moor bulk petrol installation in 1988 and after demolition in 2002 (top right)
(source: *http://www.controltowers.co.uk/C/Clifton.htm*).



B) Clifton Moor bulk petrol installation
(source: 1967-69 Ordnance Survey 1:2500 scale map,
https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954).

D) Clifton Moor bulk petrol installation
(source: Google Earth aerial photograph, August 2015).

E) Fuel pump house at RNAS Dale, Haverfordwest (photo courtesy Roger Thomas, Conflict Archaeologist).

PROJECT: CLIFTON MOOR AIRFIELD	
TITLE: BULK PETROL INSTALLATION	
SCALE: NTS	DATE: OCT 2019
EDAS	FIGURE: 2

PROJECT	CLIFTON MOOR AIRFIELD
TITLE	BULK PETROL INSTALLATION
SCALE: AS SHOWN	DATE: OCT 2019
EDAS	FIGURE: 3

455400N
458210E

455430N
458240E

A

A′

concrete panels

position of
fuel pump house

A

rubble

B

concrete
bases

fuel pump
house

opening

post

fence

gate

concrete panels

dense vegetation

455370N
458230E

fence

fence

455410N
458270E

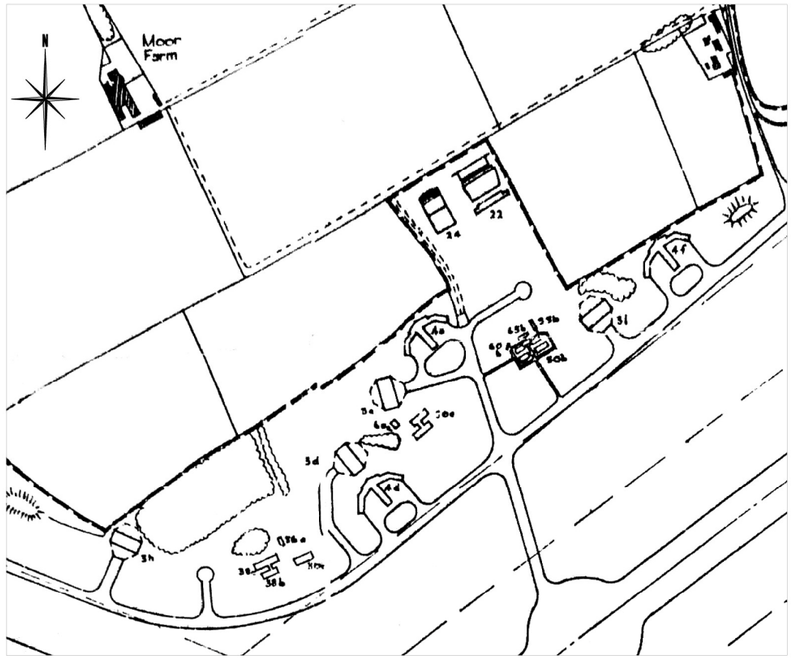
taxi-way

concrete panels

0

20m

Ground plan

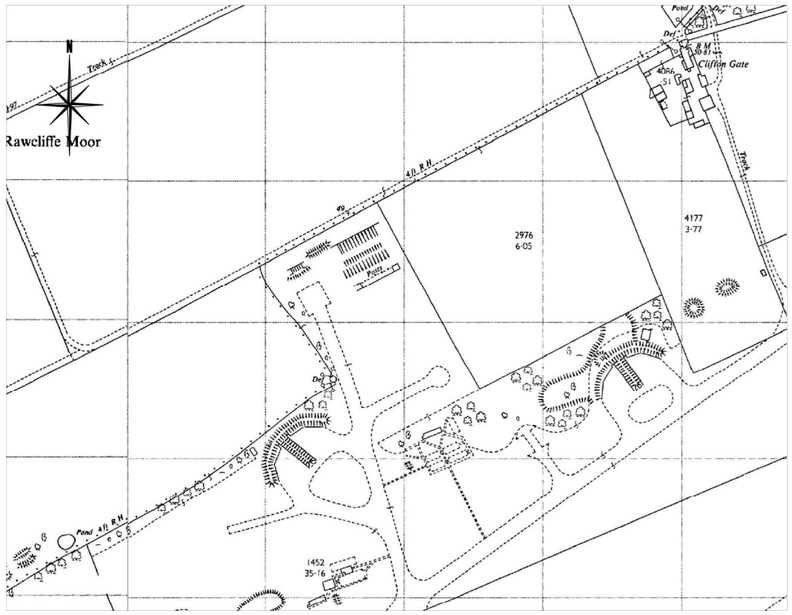


A) Clifton Moor canon butts and machine gun range (nos 24 and 22) (source: 1945 Air Ministry plan, YCA Y/ORD/4/6/52).

C) Spitfire firing at gun butts at Digby, Lincolnshire (source: ©Imperial War Museum photograph C 411).

D) Machine gun range wall at RAF Newton (source: *http://nijurbex.blogspot.com/2010/08/raf-newton-firing-range.html*).

E) Canon testing butts at Imperial War Museum, Duxford.



B) Clifton Moor canon butts and machine gun range (source: 1967-69 Ordnance Survey 1:2500 scale map, *https://www.oldmaps.co.uk/#/Map/458510/454776/12/100954*).

F) Clifton Moor canon butts and machine gun range (source: Google Earth aerial photograph, August 2015).

PROJECT: CLIFTON MOOR AIRFIELD	
TITLE: CANNON TESTING BUTTS AND MACHINE GUN RANGE	
SCALE: NTS	DATE: OCT 2019
EDAS	FIGURE: 4

PROJECT	CLIFTON MOOR AIRFIELD
TITLE	1945 AIRFIELD MAP
SCALE: NTS	DATE: OCT 2019
EDAS	FIGURE: 5

RESTRICTED

SKELETON PLANTATION

DANGER BUILDINGS

INSET — W/T TRANSMITTING SITE

TECHNICAL AREA

MAP AREA

SICK QRS SITE

WAAF SITE

MESS SITE

SCALE OF FEET

SCHEDULE OF BUILDINGS

YORK

LOCATION PLAN

SCALE OF FEET

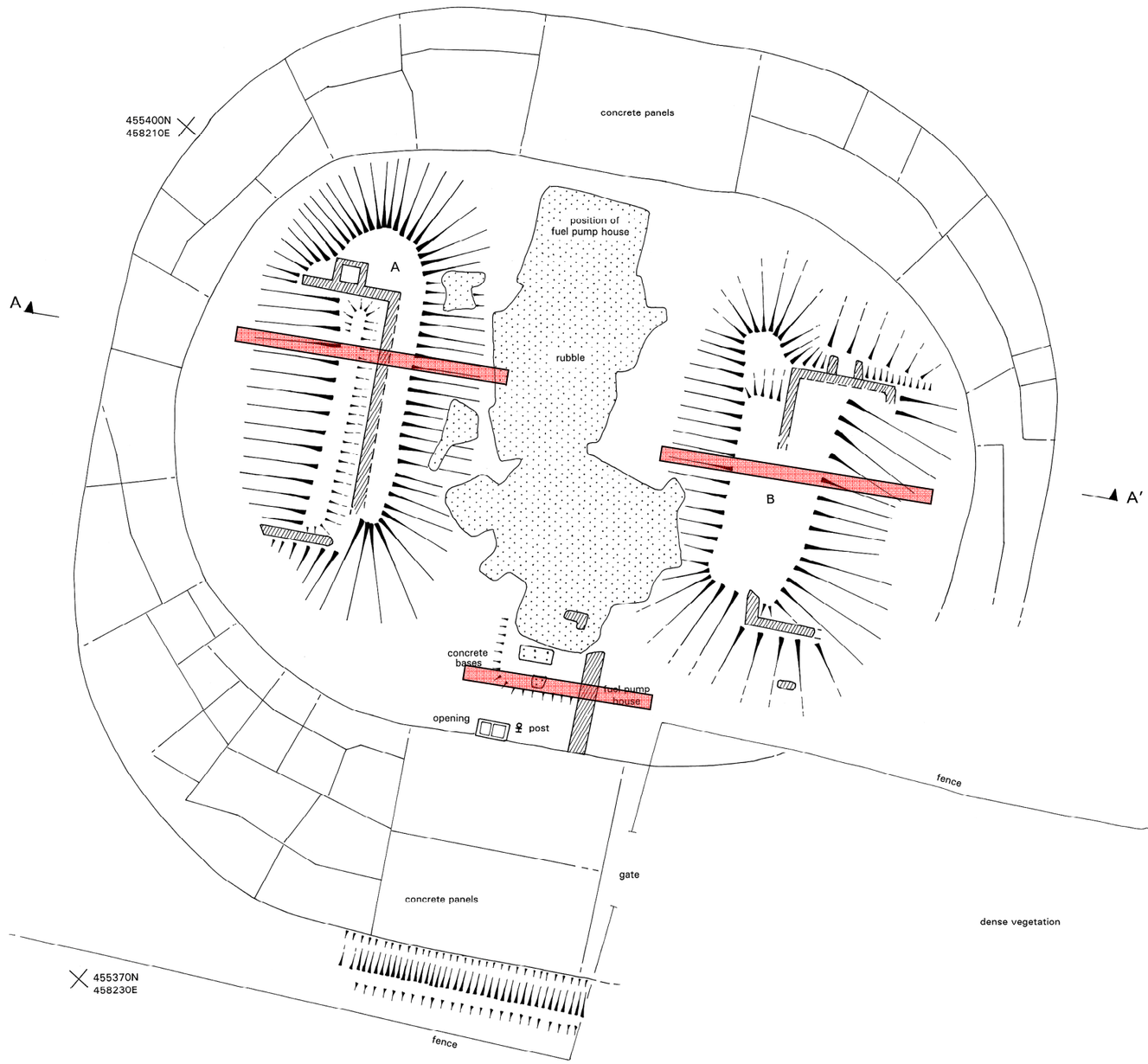
YORK

RECORD SITE PLAN

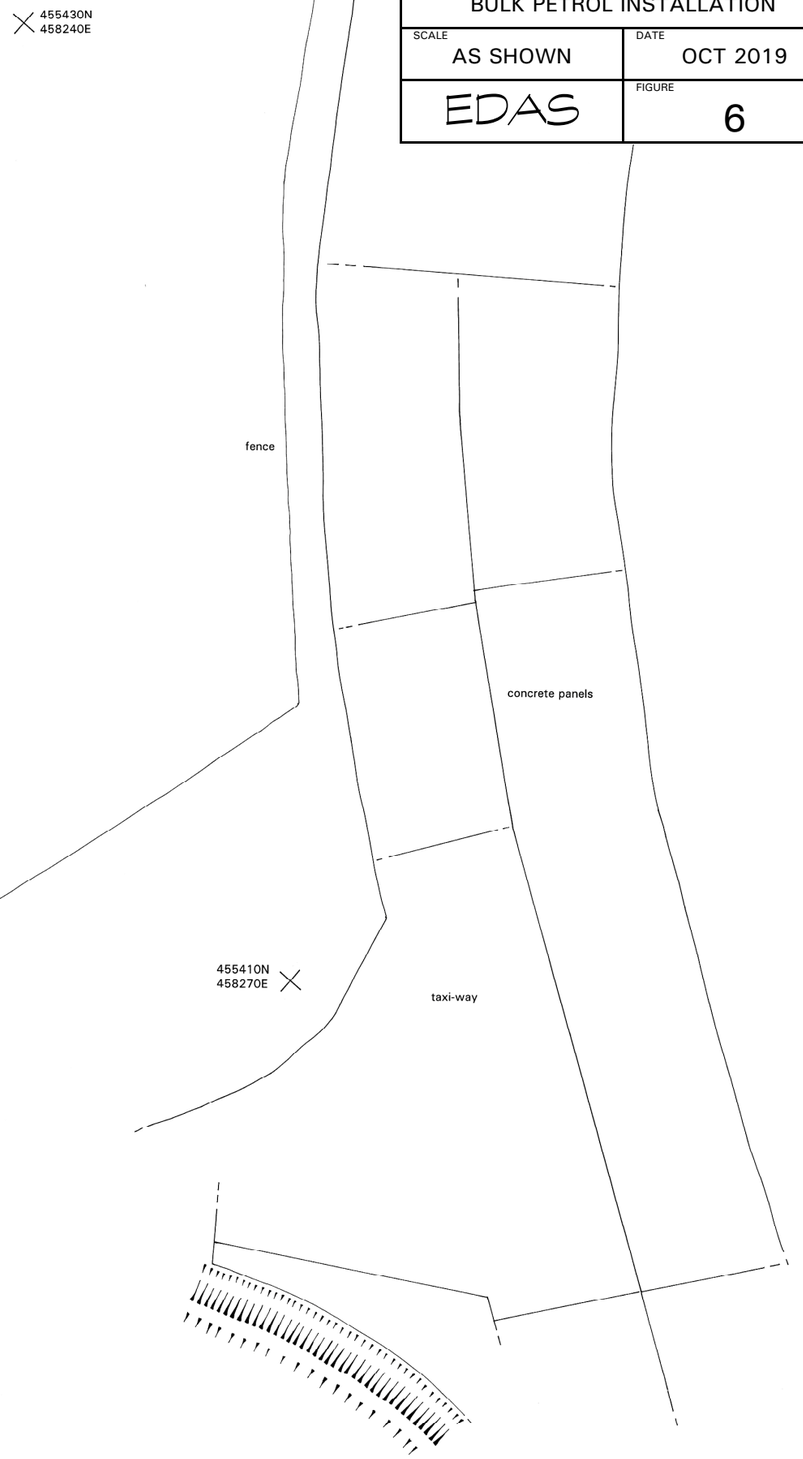
ALL SITES RESTRICTED

RESTRICTED

PROJECT	
CLIFTON MOOR AIRFIELD	
TITLE	
BULK PETROL INSTALLATION	
SCALE	DATE
AS SHOWN	OCT 2019
EDAS	FIGURE 6



Ground plan



0 20m

Idealised trench positions

PLATES

PLATE 1: East runway, prior to vegetation clearance (July 2019), looking S

PLATE 2: East taxi-way, prior to vegetation clearance (July 2019), looking N.

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 1 & 2		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 3: West taxi-way after vegetation clearance, showing excavated double light, looking S (photo 3/489).

PLATE 4: West taxi-way, excavated single light (photo3/493).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL

Title	Project No.	Drawing No.	Rev
SITE PHOTOGRAPHS	17/1027/PFCL	Plates 3 & 4	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

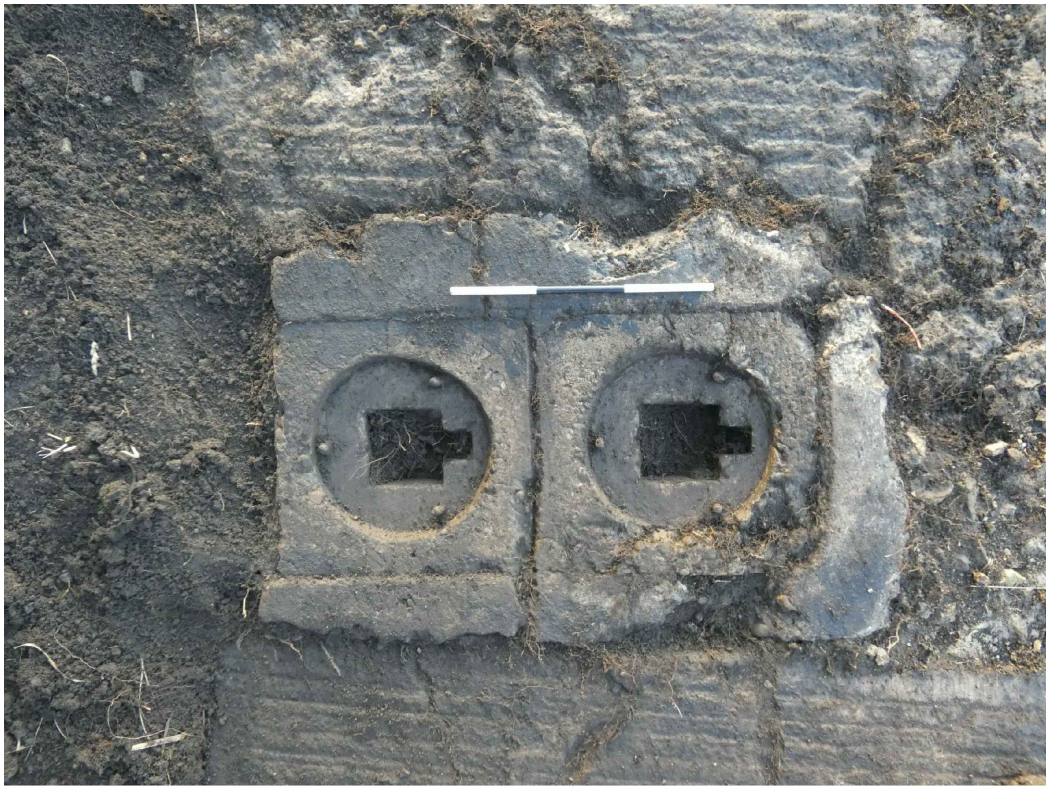


PLATE 5: West taxi-way, excavated double light (photo 3/490).

PLATE 6: West runway after vegetation clearance, looking E (photo 3/505).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 5 & 6		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 7: West runway, area of repair towards north end, looking W (photo 3/515).

PLATE 8: West runway, east side, showing drain, looking SE (photo 3/513).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 7 & 8			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 9: West runway, ex situ tank at north end, looking W (photo 3/502).

PLATE 10: Central taxi-way after vegetation clearance, looking SW (photo 3/533).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN CITY OF YORK COUNCIL	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL			Drawing No. Plates 9 & 10		Rev

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 11: Central taxi-way, concrete block to north side, looking NE (photo 3/535).

PLATE 12: Central taxi-way, drain to south side, looking S (photo 3/528).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 11 & 12			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 13: East runway after vegetation clearance, looking S (photo 3/549).

PLATE 14: East runway, excavated landing light on west side, looking S (photo 3/541).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 13 & 14		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 15: East runway, drain cover on west side, looking W (photo 3/542).

PLATE 16: East taxi-way after vegetation clearance, looking N (photo 2/472).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 15 & 16			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 17: Ruined structure, in north-west comer of Poplar Plantation, looking SE (photo 3/566).

PLATE 18: Bulk petrol installation, mound A after vegetation clearance (February 2019), looking SE.

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 17 & 18			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 19: Bulk petrol installation, mound A after excavation, showing walls of internal chamber, looking W (photo 1/426).

PLATE 20: Bulk petrol installation, mound A after excavation, showing brick walls and piers, with one anchor point, looking N (photo 1/435).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 19 & 20			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 21: Bulk petrol installation, mound A, detail of steel cable anchor, looking S (photo 1/440).

PLATE 22: Bulk petrol installation, ex situ sections of cast-iron pipes, looking S.

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 21 & 22		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 23: Bulk petrol installation, mound B after excavation, showing walls of internal chamber, looking W (photo 1/411).

PLATE 24: Bulk petrol installation, north pump house after clearance, looking NW (photo 1/445).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 23 & 24			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 25: Bulk petrol installation, south pump house after clearance and excavation, looking SW (photo 1/451).

PLATE 26: Bulk petrol installation, south pump house and stand post, looking NW (photo 2/464).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 25 & 26			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 27: View of cannon butts prior to vegetation clearance (February 2019), looking NW.

PLATE 28: Cannon butts, rear and side elevations, looking SW (photo 4/792).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 27 & 28		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 29: Cannon butts, front (south) elevation, looking NE (photo 4/782).

PLATE 30: Cannon butts, detail of wall end to easternmost bay showing rebates and concrete blocks, looking E (photo 4/789).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 29 & 30		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 31: Cannon butts, view of 'T stand' to south, looking SE (photo 4/795).

PLATE 32: Mound between cannon butts and machine gun butts, looking NW (photo 4/775).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 31 & 32			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 33: Machine gun butts, looking NW (photo 3/582).

PLATE 34: Machine gun range, north wall of butts showing buttresses and drainage holes, looking SW (photo 4/739).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 33 & 34		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 35: Machine gun butts, east end showing revetment walls, looking NW (photo 4/748).

PLATE 36: Machine gun butts, west end showing revetment walls, looking NE (photo 4/777).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 35 & 36		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 37: Machine gun range, showing relationship of butts and catch pit, looking NW (photo 3/583).

PLATE 38: Machine gun range, remains of firing shed, looking SW (photo 4/762).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
	Title	Project No.		Drawing No.			Rev
	SITE PHOTOGRAPHS	17/1027/PFCL		Plates 37 & 38			

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP

PLATE 39: Machine gun range, remains of firing shed with south wall and pillars to north wall, looking NE (photo 4/758).

PLATE 40: Machine gun range, showing relationship between firing shed, catch pit and butts, looking NW (photo 4/759).

Client	Project	Created by	Reviewer	Date	Size	Scale	Status
PELL FRISCHMANN	YNORR CLIFTON MOOR JUNCTION	PT	ED	03/20	A4	NTS	FINAL
CITY OF YORK COUNCIL	Title SITE PHOTOGRAPHS	Project No. 17/1027/PFCL		Drawing No. Plates 39 & 40		Rev	

barton•howe associates
Landscape Design I Assessment I Management
IT Centre, York Science Park, Innovation Way, Heslington, York, YO10 5NP