

## **11. The Likelihood of Contamination from German Air Delivered UXBs**

### **11.1. World War I**

During WWI Britain was targeted and bombed by Zeppelin Airships as well as Gotha and Giant fixed-wing aircraft. The objective of these raids was to unnerve the British public, to destroy strategic targets and to ultimately attempt to coerce Britain's capitulation from the war. A WWI bomb plot map of London was consulted, see **Annex G1**. Although this area of north London was targeted on 2<sup>nd</sup>/3<sup>rd</sup> September 1916 (see **Annex G2**), there is no evidence to indicate that the site was indeed bombed.

WWI bombs were generally smaller and dropped from a lower altitude than those used in WWII. This resulted in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density, the risk from WWI UXBs is considered low and will not be further addressed in this report.

### **11.2. World War II Bombing of Municipal Borough of Hornsey**

The Luftwaffe's main objective for the attacks on Britain was to inhibit the country's economic and military capability. To achieve this they targeted airfields, depots, docks, warehouses, wharves, railway lines, factories, and power stations. As the war progressed the Luftwaffe bombing campaign expanded to include the indiscriminate bombing of civilian areas in an attempt to subvert public morale.

During WWII the site was located within the Municipal Borough of Hornsey, which sustained an overall high density of bombing, as represented by bomb density data figures and maps, see **Annex H**. Unlike neighbouring Tottenham, which contained numerous targets within it (see the reservoirs highlighted in Luftwaffe target imagery in **Annex I**), Hornsey lacked such infrastructure. Bombing within the borough is therefore likely to have been less concentrated on any particular areas, with infrastructure, railways, industry and civilian centres targeted indiscriminately.

Records of bombing incidents in the civilian areas of the district were typically collected by Air Raid Precautions wardens and collated by Civil Defence personnel. Some other organisations, such as port and railway authorities, maintained separate records. Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the country most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

Records of bombing incidents are presented in the following sections.

### 11.3. WWII Home Office Bombing Statistics

The following table summarises the quantity of German air delivered bombs (excluding 1kg incendiaries and anti-personnel bombs) dropped on the Municipal Borough of Hornsey between 1940 and 1945.

| Record of German Ordnance Dropped on the Municipal Borough of Hornsey |                                  |       |
|-----------------------------------------------------------------------|----------------------------------|-------|
| Area Acreage                                                          |                                  | 2,872 |
| Weapons                                                               | High Explosive bombs (all types) | 292   |
|                                                                       | Parachute mines                  | 9     |
|                                                                       | Oil bombs                        | 28    |
|                                                                       | Phosphorus bombs                 | 5     |
|                                                                       | Fire pots                        | 0     |
|                                                                       | Pilotless aircraft (V-1)         | 17    |
|                                                                       | Long range rocket bombs (V-2)    | 4     |
| Total                                                                 |                                  | 355   |
| Number of Items per 1,000 acres                                       |                                  | 123.6 |
| Source: Home Office Statistics                                        |                                  |       |
| This table does not include UXO found during or after WWII.           |                                  |       |

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the risk relating to IBs is lesser than that relating to larger HE bombs, they were similarly designed to inflict damage and injury. Anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous. Although Home Office statistics did not record these types of ordnance, both should not be overlooked when assessing the general risk to personnel and equipment.

### 11.4. London Civil Defence Region Bomb Census Maps

During WWII, the ARP Department within the Research and Experiments Branch of the Ministry of Home Security produced both consolidated and weekly bomb census maps for the London Civil Defence Region, as well as census mapping of V-1 pilotless aircraft. These maps collectively show the approximate locations of bombs, mines and rockets dropped in the region. The site area was checked on each available map sheet. Those showing bomb incidents on and in the immediate vicinity of the site are discussed below and are presented in **Annex J1-J3**.

| Consolidated London Bomb Census Maps – Annex J11          |                                                                                        |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------|
| Date Range                                                | Comments                                                                               |
| Night Bombing up to 7 <sup>th</sup> October 1940          | No bomb strikes are plotted on or within the site's immediate vicinity.                |
| 7 <sup>th</sup> October 1940 to 6 <sup>th</sup> June 1941 | One bomb strike is plotted directly south of the site, with another to the north-west. |

| Weekly London Bomb Census Maps – Annex J2-J3             |                                                                                                                                     |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Date Range                                               | Comments                                                                                                                            |
| 7 <sup>th</sup> – 14 <sup>th</sup> October 1940          | An incendiary bombing 'shower' is recorded across the site.                                                                         |
| 28 <sup>th</sup> October – 4 <sup>th</sup> November 1940 | One HE bomb strike is plotted directly south of the site. Another bomb strike is recorded approximately 70m north-west of the site. |
| 4 <sup>th</sup> – 11 <sup>th</sup> November 1940         | One HE bomb strike is plotted within the north-western corner of the site / directly north-west.                                    |

| V-1 Pilotless Flying Bomb Census Map – Annex K |                                                                                                                                       |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Date Range                                     | Comments                                                                                                                              |
| 30 <sup>th</sup> / 31 <sup>st</sup> July 1944  | No V-1 strikes are plotted directly on site. The closest V-1 strike to the site is plotted approximately 460m north-west of the site. |

#### 11.5. Hornsey Bomb Plot Map

A local bomb map compiled by ARP wardens showing bomb strikes on the Municipal Borough of Hornsey was obtained from Haringey Archives. The section showing the area of the site is described in the table below and presented in **Annex L**.

| Hornsey Bomb Plot Map – Annex L |                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date Range                      | Comments                                                                                                                                                                |
| 1939-1945                       | No bomb strikes are plotted directly on site. However, one HE is plotted approximately 15m south-east of the site and another approximately 45m north-west of the site. |

#### 11.6. Middlesex County Council Log Book of Air Raid Incidents

The Middlesex County Council Log Book of Air Raid Incidents for Hornsey was obtained from the London Metropolitan Archives. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex M**.

| Middlesex County Council Log Book of Air Raid Incidents – Annex M |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date                                                              | Record Transcription                                                                                                                                                                                                                                                                                                                                                                                                               |
| 13 <sup>th</sup> September 1940                                   | Minor Bombing HE + IB. Roseberry Gardens. Crouch End. Fire.<br><i>Roseberry Gardens was situated directly south-west of the site.</i>                                                                                                                                                                                                                                                                                              |
| 1 <sup>st</sup> /2 <sup>nd</sup> November 1940                    | M.B. HE Tottenham Lane. Fairfield Rd and Hermiston Avenue / Tottenham Lane blocked.<br>Minor damage. Flooding Tottenham Lane. Damage to [...] main. Tottenham Lane and Middle Lane blocked.<br>MB. Fairfield Rd. damage by blast from incident Elmfield Rd. Gas & water main damage.<br><i>This occurred within the site vicinity. The site was bordered by Elmfield Avenue to the north and Tottenham Lane to the south-east.</i> |
| 8 <sup>th</sup> November 1940                                     | Minor bombing. HE's. Elmfield Avenue + Roseberry Gardens. Casualties: 6 (2 serious).<br><i>This incident occurred within the site vicinity. The site was situated between these two roadways, with Elmfield Avenue directly north and Roseberry Gardens directly south-west.</i>                                                                                                                                                   |

### 11.7. Hornsey Register of Incidents

The Hornsey Register of Incidents was obtained from the Haringey Archives. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex N**.

| Hornsey Register of Incidents |                                                    |                                                                                                                         |
|-------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Street                        | Date Range                                         | Comments                                                                                                                |
| Elmfield Avenue               | 1 <sup>st</sup> / 2 <sup>nd</sup> November 1940    | Elmfield Avenue junction Hermiston Road. HE.<br><i>This incident occurred approximately 60m north-west of the site.</i> |
|                               | 8 <sup>th</sup> / 9 <sup>th</sup> November 1940    | 36, 38 Elmfield Avenue. HE.<br><i>This incident occurred approximately 45m north-west of the site.</i>                  |
| Rosebery Gardens              | 12 <sup>th</sup> / 13 <sup>th</sup> September 1940 | 49 Rosebery Gardens. AA.<br><i>This incident occurred approximately 20m west of the site.</i>                           |
|                               | 16 <sup>th</sup> November 1940                     | 27 Rosebery Gardens. U.X.A.A.<br><i>This incident occurred approximately 90m west of the site.</i>                      |
|                               | 19 <sup>th</sup> February 1944                     | 18 Rosebery Gardens. IB.<br><i>This incident occurred approximately 115m west of the site</i>                           |
| Tottenham Lane                | 1 <sup>st</sup> / 2 <sup>nd</sup> November 1940    | In roadway opposite Y.M.C.A<br><i>This incident occurred directly east of the site.</i>                                 |

### 11.8. Air Raid Damage Records

Air Raid Damage Records were obtained from the Haringey Archives. These contained information such as the date, location and type of bomb. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex O**.

| Air Raid Damage Records |                                 |                                                                                                                                                                                                                               |
|-------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Street                  | Date Range                      | Comments                                                                                                                                                                                                                      |
| Elmfield Avenue         | 8 <sup>th</sup> November 1940   | HE at rear of 36 / 38 Elmfield Avenue. Serious damage to property. Main damaged.<br><i>This incident occurred approximately 40m north-west of the site.</i>                                                                   |
| Hermiston Avenue        | 1 <sup>st</sup> November 1940   | HE at Hermiston Avenue junction Elmfield Road.<br><i>This incident occurred approximately 60m north-west of the site.</i>                                                                                                     |
| Rosebery Gardens        | 13 <sup>th</sup> September 1940 | AA Shell. 39 Rosebery Gardens. Fire, slight damage to building.<br><i>This incident occurred approximately 50m west of the site.</i>                                                                                          |
|                         | 16 <sup>th</sup> November 1940  | AA U.X. 27 Rosebery Gardens. Slight damage to house.<br><i>This incident occurred approximately 90m west of the site.</i>                                                                                                     |
| Tottenham Lane          | 1 <sup>st</sup> November 1940   | HE at junction Elmfield Avenue / Tottenham Lane. Serious damage to property over a wide area. Damage to water main, serious flooding. 7 killed, 39 injured.<br><i>This incident occurred directly north-east of the site.</i> |

## 11.9. Incident Records

Incident Records were obtained from the Haringey Archives. These contained information such as the date, location and type of bomb. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex P**.

| Incident Records                                    |                                                                                                                                                                                                          |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date Range                                          | Comments                                                                                                                                                                                                 |
| 11 <sup>th</sup> / 12 <sup>th</sup> September 1940. | AA Shell on 39 Rosebery Gardens. Damage to front of house.<br><i>This incident occurred approximately 50m west of the site.</i>                                                                          |
| 1 <sup>st</sup> / 2 <sup>nd</sup> November 1940.    | HE on YMCA Tottenham Lane in roadway. Water main damage. Fire.<br>102 evacuated. Tottenham Lane, Elmfield Avenue & Rosebery Gardens blocked.<br><i>This incident occurred directly east of the site.</i> |
|                                                     | HE. Hermiston and Elmfield Avenue Junction. Water and coal gas. Mains. Fire.<br><i>This incident occurred approximately 60m north-west of the site.</i>                                                  |
| 8 <sup>th</sup> / 9 <sup>th</sup> November 1940     | HE at 36 / 38 Elmfield Avenue – rear. Damage: Coal gas. Serious to property.<br><i>This incident occurred approximately 40m north-west of the site.</i>                                                  |
| 16 <sup>th</sup> November 1940                      | UX AA Shell. 27 Rosebery Gardens. Damage to roof and ceiling.<br><i>This incident occurred approximately 90m west of the site.</i>                                                                       |
| 19 <sup>th</sup> February 1944                      | Rocket Shell. 18 Rosebery Gardens. Small fire. The date of this incident was 19 <sup>th</sup> February 1944.<br><i>This incident occurred approximately 115m west of the site.</i>                       |

## 11.10. Online Information

Several online sources indicate that the YMCA building sustained bomb damage during WWII, as did neighbouring buildings: see extracts from these sources in the table below.

| Online / Anecdotal Sources                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In the war the building sustained some bomb damage whilst neighbouring houses and the cinema opposite were completely destroyed. <sup>1</sup>                                                                                                                                                                                                                            |
| The Art Deco building, completed in 1929, was the culmination of years of fund-raising and planning. Little remains of this original structure: the centre was on the edge of a high explosive impact during World War II and suffered considerable damage. A red brick extension was opened in 1959, with a restaurant and greater number of hostel rooms. <sup>2</sup> |
| In 1929, it was re-furbished and Western Electric(WE) sound equipment was installed. It was re-named Plaza Cinema. It was independently operated throughout its life and was closed in September 1939 at the outbreak of World War II. The Plaza Cinema was badly damaged in German air raids and never re-opened. <sup>3</sup>                                          |

<sup>1</sup> <https://harringayonline.com/photo/crouch-hill-1905?context=latest>

<sup>2</sup> <https://www.lyndongoode.com/ymca-north-london.html>

<sup>3</sup> <https://cinematreasures.org/theaters/28400>

### 11.11. Middlesex County Council War Damage Map

Map sheets compiled by Middlesex County Council (MCC) showing the extent of wartime bomb damage over the area of the site were consulted at London Archives. The section showing the area of the site is described in the table below and presented in **Annex Q**.

It should be highlighted that this source only records the following damage categories: 'Category 1: Total damage, building to be demolished', 'Category 2: Some repairs possible, but could become Cat 1' and 'Category 3: Borderline areas, uncertain whether repairs possible, might have to be demolished'. The lesser damage categories, such as seriously damaged but repairable at cost and general blast damage, were not used.

| MCC War Damage Map |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date Range         | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 1939-45            | The residential properties on site and adjacent are described as having sustained 'Category 2' damage: "some repairs possible, but could become Cat 1" (with Category 1 referring to "total damage, building to be demolished"). Meanwhile the YMCA building and adjacent properties are described as being subject to 'Category 3' damage; "border line areas, uncertain whether repairs possible, might have to be demolished". Further Category 2 damage is also recorded across Tottenham Lane to the south. |

### 11.12. WWII-Era Aerial Photography

WWII-era aerial photography for the site area was obtained from the National Monuments Record Office (Historic England). This photography provides a record of the potential composition of the site during the war, as well as its condition immediately following the war (see **Annex R**).

| WWII-Era Aerial Photography |                                                                                                                                                                                                                                                                       |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date/Title                  | Description                                                                                                                                                                                                                                                           |
| 24 <sup>th</sup> July 1947  | This post-war aerial photograph indicates that all of the residential properties on site had been cleared, along with the structures adjacent; a large area of clearance can be seen immediately north-west. A small part of the YMCA building had also been removed. |

### 11.13. Abandoned Bombs

A post air-raid survey of buildings, facilities, and installations would have included a search for evidence of bomb entry holes. If evidence of an entry hole was encountered, Bomb Disposal Officer Teams would normally have been requested to attempt to locate, render safe, and dispose of the bomb. Occasionally, evidence of UXBs was discovered but due to a relatively benign position, access problems, or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an 'abandoned bomb'.

Given the inaccuracy of WWII records, and the fact that these bombs were 'abandoned', their locations cannot be considered definitive or the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

1st Line Defence holds no records of officially registered abandoned bombs at or near the site of the proposed works.

#### 11.14. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (now part of 29 EOD & Search Group) no longer processes commercial requests for information. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works.

If any relevant information is received at a later date, YMCA London City and North will be advised.

#### 11.15. Evaluation of German Air Delivered UXO Records

| German Air Delivered UXO Records Summary                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Factors                                                                                                                                                                                                                                                                                                                                                                                                    | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Density of Bombing</b><br><i>It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.</i>                                                                                                                                                     | <p>During WWII the site was situated in the Municipal Borough of Hornsey. According to official Home Office bombing statistics this borough sustained an overall high density of bombing, with 355 items of ordnance recorded to have fallen within the 2,872 acre borough, or an average of 123.6 items per 1,000 acres.</p> <p>Multiple HE bomb strikes were recorded within the site's immediate vicinity across mapping and written records in November 1940. London Bomb Census Mapping records one HE bomb strike directly on / directly north-west of the site, with another bomb strike directly south-east on Tottenham Lane. An incendiary bombing 'shower' is also recorded across the site in October 1940.</p> <p>This is generally corroborated by written records. The Hornsey Register of Incidents, Air Raid Damage Records and Incident Records each recorded one HE on the roadway outside the YMCA building on Tottenham Lane on the 1<sup>st</sup>/2<sup>nd</sup> November 1940; the YMCA building was situated on site. Another HE bomb fell on this date approximately 60m north-west of the site, and one further bomb is also recorded approximately 40m north-west of the site the following week, on the 8<sup>th</sup>/9<sup>th</sup> November 1940.</p> |
| <b>Damage</b><br><i>If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids. Similarly, a high explosive bomb strike in an area of open agricultural land will have caused soil disturbance, increasing the risk that a UXB entry hole would be overlooked.</i> | <p>Middlesex County Council (MCC) War Damage Mapping indicates that the residential properties on site and adjacent sustained 'Category 2' damage: "some repairs possible, but could become Cat 1" (with Category 1 referring "total damage, building to be demolished"). Meanwhile the YMCA building and adjacent properties are described as being subject to 'Category 3' damage; "border line areas, uncertain whether repairs possible, might have to be demolished".</p> <p>This is corroborated by both post-war OS mapping as well as post-war aerial photography dated 1947 which indicates that the majority of the structures on and adjacent to the site had been cleared, with only the YMCA still standing.</p> <p>Damage to the YMCA building and neighbouring residential properties on site is corroborated by online sources. One states that "the building sustained some bomb damage whilst neighbouring houses and the cinema opposite were completely destroyed". Another notes that "the centre was on the edge of a high explosive impact during World War II and suffered considerable damage."</p>                                                                                                                                                         |

|                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ground Cover</b><br><i>The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.</i>                                                                                                                                                                                           | Wartime aerial photography from 1947 along with post-war OS mapping indicates that all of the residential properties on site had been cleared, along with the structures adjacent, likely because of the bomb strikes in November 1940. The YMCA building is also recorded to have sustained considerable bomb damage. Any items of UXO are considered more likely to go missing, and thus unreported, in areas subject to clearance and bombing damage; ruins, rubble, and debris likely present across the site could easily obscure evidence of UXO, such as bomb entry holes, which could be as small as 20cm in diameter. Therefore, groundcover on site for the majority of the war is not thought to be conducive to UXO detection. |
| <b>Access Frequency</b><br><i>UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied. The importance of a site to the war effort is also an important consideration as such sites are likely to have been both frequently visited and subject to post-raid checks for evidence of UXO.</i> | Following the bomb strikes on and within the site's immediate vicinity, the YMCA building was significantly damaged, and all of the residential structures on and adjacent to the site had been cleared. As a result, access to the site is thought to have been significantly reduced. Evidence of UXO is more likely to go unnoticed and unrecorded within infrequently accessed areas.                                                                                                                                                                                                                                                                                                                                                  |
| <b>Bomb Failure Rate</b>                                                                                                                                                                                                                                                                                                                                                    | There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Abandoned Bombs</b>                                                                                                                                                                                                                                                                                                                                                      | 1 <sup>st</sup> Line Defence holds no records of abandoned bombs at or within the site vicinity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Bombing Decoy sites</b>                                                                                                                                                                                                                                                                                                                                                  | 1 <sup>st</sup> Line Defence could find no evidence of bombing decoy sites within the site vicinity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Bomb Disposal Tasks</b>                                                                                                                                                                                                                                                                                                                                                  | 1 <sup>st</sup> Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 12. Introduction to Allied Ordnance

### 12.1. General

Many areas across the UK may be at risk from Allied UXO because of both wartime and peacetime military use. Typical military activities and uses that may have led to a legacy of military UXO at a site include former minefields, home guard positions, anti-aircraft emplacements, training and firing ranges, military camps, as well as weapons manufacture and storage areas.

Although land formerly used by the military was usually subject to clearance before returned to civilian use, items of UXO are sometimes discovered and can present a potential risk to construction projects.

It should be highlighted that there is no evidence that the site formerly had any military occupation or usage that could have led to contamination with such items of Allied ordnance. Despite this, urban areas, such as the location of the site, can be at risk from buried unexploded anti-aircraft projectiles fired during WWII – as addressed below.

### 12.2. Defending the UK From Aerial Attack

During WWII the War Office employed a number of defence tactics against the Luftwaffe from bombing major towns, cities, manufacturing areas, ports and airfields. These can be divided into passive and active defences (examples are provided in the table below).

| Active Defences                                                                                                                                                                                                           | Passive Defences                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Anti-aircraft gun emplacements to engage enemy aircraft.</li><li>• Fighter aircraft to act as interceptors.</li><li>• Rockets and missiles were used later during WWII.</li></ul> | <ul style="list-style-type: none"><li>• Blackouts and camouflaging to hinder the identification of Luftwaffe targets.</li><li>• Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas.</li><li>• Barrage balloons forced enemy aircraft to greater altitudes.</li><li>• Searchlights were often used to track and divert adversary bomber crews during night raids.</li></ul> |

Active defences such as anti-aircraft artillery present a greater risk of UXO contamination than passive defences. Unexploded ordnance resulting from dogfights and fighter interceptors is rarely encountered and difficult to accurately qualify.

### 12.3. Anti-Aircraft Artillery (AAA)

During WWII three main types of gun sites existed: heavy anti-aircraft (HAA), light anti-aircraft (LAA) and 'Z' batteries (ZAA). If the projectiles and rockets fired from these guns failed to explode or strike an aircraft they would descend back to land. The table below provides further information on the operation and ordnance associated with these type of weapons.

| Anti-Aircraft Artillery              |                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |              |                  |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|------------------|
| Item                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |              |                  |
| HAA                                  | These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.                                                                                                                                                        |         |              |                  |
| LAA                                  | These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m. |         |              |                  |
| Variations in HAA and LAA Ammunition | Gun type                                                                                                                                                                                                                                                                                                                                                                                                                                      | Calibre | Shell Weight | Shell Dimensions |
|                                      | 3.0 Inch                                                                                                                                                                                                                                                                                                                                                                                                                                      | 76mm    | 7.3kg        | 76mm x 356mm     |
|                                      | 3.7 Inch                                                                                                                                                                                                                                                                                                                                                                                                                                      | 94mm    | 12.7kg       | 94mm x 438mm     |
|                                      | 4.5 Inch                                                                                                                                                                                                                                                                                                                                                                                                                                      | 114mm   | 24.7kg       | 114mm x 578mm    |
|                                      | 40mm                                                                                                                                                                                                                                                                                                                                                                                                                                          | 40mm    | 0.9kg        | 40mm x 311mm     |
| Z-AA                                 | Rockets were commonly designed to destroy heavily armoured military vehicles (anti-tank weapon). The device contains an explosive head (warhead) that can be accelerated using internal propellants to an intended target. Anti-aircraft rocket batteries were also utilised as part of air defence measures.                                                                                                                                 |         |              |                  |

The conditions in which anti-aircraft projectiles may have fallen unnoticed within a site area are analogous to those regarding air delivered ordnance. Unexploded anti-aircraft projectiles could essentially have fallen indiscriminately anywhere within range of the guns. The chance of such items being observed, reported and removed during the war depends on factors such as land use, ground cover, damage and frequency of access – the same factors that govern whether evidence of a UXB is likely to have been noted. More information about these factors with regards to this particular site can be found in the German Air Delivered Ordnance section of this report.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Appendix iv**.

### 13. The Likelihood of Contamination from Allied Ordnance

#### 13.1. Introduction

There are several factors that may serve to either affirm, increase, or decrease the level of risk within a site with a history of military usage. Such factors are typically dependent upon the proximity of the proposed area of works to training activities, munition productions and storage, as well as its function across the years.

This section will examine the history of the proposed site and assess to what degree, if any, the site could have become contaminated as a result of the military use of the surrounding area.

#### 13.2. Evaluation of Contamination Risk from Allied UXO

1st Line Defence has considered the following potential sources of Allied ordnance contamination:

| Allied UXO Records Summary                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sources of Allied UXO Contamination                                                                                                                                                                                                                                                                 | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Military Camps</b><br><i>Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.</i>                                                                                                                | 1 <sup>st</sup> Line Defence could find no evidence of a military camp within the site.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Anti-Aircraft Defences</b><br><i>Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.</i>                                                                                                           | <p>1<sup>st</sup> Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAA was located approximately 3.1km south-east of the site. Despite this distance the maximum effective range of an AA projectile can be up to 15km.</p> <p>The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are generally analogous to those regarding German air delivered ordnance.</p> |
| <b>Home Guard Activity</b><br><i>The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.</i>                                                                                                                | Evidence of Home Guard activity is often difficult to locate, owing to the ad-hoc nature of Home Guard activity within each local area. Such training was often conducted on a small scale at the discretion of individual commanders and as such was seldom recorded officially. As such, no positive evidence could be found to confirm the presence of HG units within proximity to the site.                                                                                                             |
| <b>Defensive Positions</b><br><i>Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.</i>                                                                                                                               | There is no evidence of any pillbox, emplacement or other defensive features formerly located on or bordering the site footprint.                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Training or firing ranges</b><br><i>Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.</i> | No evidence of training or firing ranges could be found within the site or surrounding area.                                                                                                                                                                                                                                                                                                                                                                                                                 |



|                                                                                                                                                                                                                          |                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Defensive Minefields</b><br><i>Minefields were placed in strategic areas to defend the country in the event of a German invasion. Minefields were not always cleared with an appropriate level of vigilance.</i>      | There is no evidence of defensive minefields affecting the site.                                           |
| <b>Ordnance Manufacture</b><br><i>Ordnance manufacture indicates an increased chance that items of ordnance were stored, or disposed of, within a location.</i>                                                          | No information of ordnance being stored, produced, or disposed of within the proposed site could be found. |
| <b>Military Related Airfields</b><br><i>Military airfields present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training or bombing practice.</i> | The site was not situated within the perimeters or vicinity of a military airfield.                        |

## 14. The Likelihood of UXO Contamination Summary

The following table assesses the likelihood that the site was contaminated by items of German air delivered and Allied ordnance. Factors such as the risk of UXO initiation, remaining, and encountering will be discussed later in the report.

| UXO Contamination Summary               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Quality of the Historical Record</b> | <p>The research has evaluated pre- and post-WWII Ordnance Survey maps, Luftwaffe reconnaissance imagery, WWI Bomb Plot Maps of London, London Bomb Census Mapping, London V-1 'Flying Bomb' Map, Hornsey Bomb Plot Map, Middlesex County Council Log Book of Air Raid Incidents, Hornsey Incident Records, Middlesex County Council Bomb Damage Map, post-WWII RAF Aerial Photography, and anecdotal information available online. .</p> <p>The record set is of generally good quality, with most record sets corroborating the locations of bomb strikes on/around the site boundary. Furthermore, the availability of post-war aerial imagery has aided in the assessment of wartime and post-war conditions on site.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>German Air-Delivered Ordnance</b>    | <ul style="list-style-type: none"> <li>During WWII the site was situated in the Municipal Borough of Hornsey. According to official Home Office bombing statistics this borough sustained an overall high density of bombing, with 355 items of ordnance recorded to have fallen within the 2,872 acre borough, or an average of 123.6 items per 1,000 acres.</li> <li>During WWII, the south-western half of the site was occupied by a row of residential properties on Tottenham Lane whilst the north-eastern half of the site was occupied by the YMCA building.</li> <li>Multiple bomb strikes were recorded within the site's immediate vicinity across mapping and written records in November 1940. London Bomb Census Mapping records one HE bomb strike directly on / directly north-west of the site, with another bomb strike recorded directly south-east on Tottenham Lane. An incendiary bombing 'shower' is also recorded across the site in October 1940.</li> <li>Similarly, the Hornsey Register of Incidents, Air Raid Damage Records and Incident Records each recorded one HE on the roadway outside the YMCA building on Tottenham Lane on the 1<sup>st</sup>/2<sup>nd</sup> November 1940; with this building being situated on site, and the roadway directly bordering. Another HE bomb fell on this date approximately 60m north-west of the site, and one further bomb is also recorded approximately 40m north-west of the site the following week, on the 8<sup>th</sup>/9<sup>th</sup> November 1940.</li> <li>Middlesex County Council (MCC) War Damage Mapping indicates that the residential properties on site and adjacent sustained 'Category 2' damage: "some repairs possible, but could become Cat 1" (with Category 1 referring to "total damage, building to be demolished"). Meanwhile the YMCA building and adjacent properties are described as being subject to 'Category 3' damage; "border line areas, uncertain whether repairs possible, might have to be demolished". This is corroborated by both post-war OS mapping as well as post-war aerial photography dated 1947 which indicates that the majority of the structures on and adjacent to the site had been cleared, with only the YMCA still standing.</li> <li>Damage to the YMCA building and neighbouring residential properties on site is further corroborated by online sources; one states that "the building sustained some bomb damage whilst neighbouring houses and the cinema opposite were completely destroyed", and another notes that "the centre was on the edge of a high explosive impact during World War II and suffered considerable damage."</li> <li>Any items of UXO are considered more likely to go missing, and thus unreported, in areas subject to clearance and bombing damage; ruins, rubble, and debris likely present across the site following the bombing in November 1940 could have easily obscured evidence of UXO, such as bomb entry holes, which could be as small as 20cm in diameter. Therefore, groundcover on site for the majority of the war is not thought to have been conducive to UXO detection.</li> <li>Furthermore, following the bomb strikes and significant damage sustained on and within the site's immediate vicinity, access to the site is thought to have been significantly reduced, as the area would have been evacuated and deemed unsafe. Evidence of UXO is more likely to go unnoticed and unrecorded within infrequently accessed areas.</li> </ul> |



|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <ul style="list-style-type: none"><li>• In summary, multiple bomb strikes were recorded on / within the site's immediate vicinity, along with a significant level of damage / clearance to the structures on and adjacent to the site. Following the bomb strikes and damage recorded, and the clearance evident on aerial photography and OS mapping, it is anticipated that access to the site would have been infrequent for the majority of the war, and groundcover would not have been conducive to UXO detection, with the potential for rubble to obscure a UXB entry hole. As a result of these factors, the site is therefore considered to be at a <b>Medium Risk</b> of UXO contamination.</li></ul> |
| Allied Ordnance | <ul style="list-style-type: none"><li>• No evidence could be found to indicate that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA.</li><li>• The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding air delivered ordnance.</li></ul>                                                                                                                                                                                                                                                                                       |

## **15. The Likelihood that UXO Remains**

### **15.1. Introduction**

It is important to consider the extent to which any explosive ordnance clearance (EOC) activities or extensive ground works have occurred on site. This may indicate previous ordnance contamination or reduce the risk that ordnance remains undiscovered.

### **15.2. UXO Clearance**

1st Line Defence has found no evidence in the public domain or within internal records that any official ordnance clearance operations have taken place on site. Note however that we have not received confirmation of this fact from the 33 EOD Regiment Archive (now part of 29 EOD & Search Group). It should also be noted that in addition to 29 EOD & Search Group archival information, 1st Line Defence also do not currently have access to data that may be relevant including 5131(BD)SQN Archive, SD Training Technical Advisory Section (TAS) and MACA Records (bomb disposal callouts).

If such information is available at a later date, it is recommended that it be reviewed as it will assist with understanding both levels and types of contamination likely to be present, and may indicate risk reduction in certain areas.

### **15.3. Post-War Redevelopment**

Pre-war residential buildings are shown to have been cleared on 1950s post-war OS mapping. Recent aerial imagery indicates an extension of the existing YMCA centre has taken place in the years since WWII.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. For example, the risk from deep buried UXO will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will however remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

## **16. The Likelihood of UXO Encounter**

### **16.1. Introduction**

For UXO to pose a risk at a site, there should be a means by which any potential UXO might be encountered on that site.

The likelihood of encountering UXO on the site of proposed works would depend on various factors, such as the type of UXO that might be present and the intrusive works planned on site. In most cases, UXO is more likely to be present below surface (buried) than on surface.

In general, the greater the extent and depth of intrusive works, the greater the risk of encountering. The most likely scenarios under which items of UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Generally speaking, the risk of encountering any type of UXO will be minimal for any works planned within the footprint and down to the depth of post-war foundations and excavations.

### **16.2. Encountering Air Delivered Ordnance**

Since an air delivered bomb may come to rest at any depth between just below ground level and its maximum penetration depth, there is a chance that such an item (if present) could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level as well as at depth.

## 17. The Likelihood of UXO Initiation

### 17.1. Introduction

UXO does not spontaneously explode. Older UXO devices will require an external event/energy to create the conditions for detonation to occur. The likelihood that a device will function can depend on a number of factors including the type of weaponry, its age and the amount of energy it is struck with.

### 17.2. Initiating Air Delivered Ordnance

Unexploded bombs do not spontaneously explode. All high explosive filling requires significant energy to create the conditions for detonation to occur.

In recent decades, there have been a number of incidents in Europe where Allied UXBs have detonated, and incidents where fatalities have resulted. There have been several hypotheses as to the reason why the issue is more prevalent in mainland Europe – reasons could include the significantly greater number of bombs dropped by the Allied forces on occupied Europe, the preferred use by the Allies of mechanical rather than electrical fuzes, and perhaps just good fortune. The risk from UXO in the UK is also being treated very seriously in many sectors of the construction industry, and proactive risk mitigation efforts will also have affected the lack of detonations in the UK.

There are certain construction activities which make initiation more likely, and several potential initiation mechanisms must be considered:

| UXB Initiation                |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Direct Impact</b>          | Unless the fuze or fuze pocket is struck, there needs to be a significant impact e.g. from piling or large and violent mechanical excavation, onto the main body of the weapon to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.                                                                                                                                                                             |
| <b>Re- starting the Clock</b> | A small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion would have taken place within the fuze mechanism over the last 70+ years that would prevent clockwork mechanisms from functioning. Nevertheless, it was reported that the clockwork fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-start.                                                                    |
| <b>Friction Impact</b>        | The most likely scenario resulting in the detonation of a UXB is friction impact initiating the shock-sensitive fuze explosive. The combined effects of seasonal changes in temperature and general degradation over time can cause explosive compounds to crystallise and extrude out from the main body of the bomb. It may only require a limited amount of energy to initiate the extruded explosive which could detonate the main charge. |

## **18. Consequences of Initiation/Encounter**

### **18.1. Introduction**

The repercussions of the inadvertent detonation of UXO during intrusive ground works, or if an item or ordnance is interfered with or disturbed, are potentially profound, both in terms of human and financial cost. A serious risk to life and limb, damage to plant and total site shutdown during follow-up investigations are potential outcomes. However, if appropriate risk mitigation measures are put in place, the chances of initiating an item of UXO during ground works is comparatively low.

The consequences of encountering UXO can be particularly notable in the case of high-profile sites (such as airports and train stations) where it is necessary to evacuate the public from the surrounding area. A site may be closed for anything from a few hours to a week with potentially significant cost in lost time. It should be noted that even the discovery of suspected or possible item of UXO during intrusive works (if handled solely through the authorities), may also involve significant loss of production.

### **18.2. Consequences of Detonation**

When considering the potential consequences of a detonation, it is necessary to identify the significant receptors that may be affected. The receptors that may potentially be at risk from a UXO detonation on a construction site will vary depending on the site specific conditions but can be summarised as follows:

- People – site workers, local residents and general public.
- Plant and equipment – construction plant on site.
- Services – subsurface gas, electricity, telecommunications.
- Structures – not only visible damage to above ground buildings, but potentially damage to foundations and the weakening of support structures.
- Environment – introduction of potentially contaminating materials.

## 19. 1st Line Defence Risk Assessment

### 19.1. Risk Assessment Stages

Taking into account the quality of the historical evidence, the assessment of the overall risk from unexploded ordnance is based on the following five considerations:

1. That the site was contaminated with unexploded ordnance.
2. That unexploded ordnance remains on site.
3. That such items will be encountered during the proposed works.
4. That ordnance may be initiated by the works operations.
5. The consequences of encountering or initiating ordnance.

### 19.2. Assessed Risk Level

1st Line Defence has assessed that there is an overall **Medium Risk** from German and anti-aircraft unexploded ordnance at the site of proposed works. There is an assessed **Negligible Risk** from Allied unexploded ordnance.

| Ordnance Type                                 | Risk Level |     |        |      |
|-----------------------------------------------|------------|-----|--------|------|
|                                               | Negligible | Low | Medium | High |
| German Unexploded HE Bombs                    |            |     | ✓      |      |
| German 1kg Incendiary Bombs                   |            |     | ✓      |      |
| Anti-Aircraft Artillery Projectiles           |            |     | ✓      |      |
| Allied Land Service and Small Arms Ammunition | ✓          |     |        |      |

This report has been undertaken with due diligence, and all reasonable care has been taken to access and analyse relevant historical information. By necessity, when dealing historical evidence, and when making assessments of UXO risk, various assumptions have to be made which we have discussed and justified throughout this report. Our reports take a common-sense and practical approach to the assessment of risk, and we strive to be reasonable and pragmatic in our conclusions.

It should however be stressed that if any suspect items are encountered during the proposed works, 1st Line Defence should be contacted for advice/assistance, and to re-assess the risk where necessary. The mitigation measures outlined in the next section are recommended as a minimum precaution to alert ground personnel to the history of the site, what to look out for, and what measures to take in the event that a suspect item is encountered. It should also be noted that the conclusions of this report are based on the scope of works outlined in the 'Proposed Works' section of this report. Should the scope of works change or additional works be proposed, 1st Line Defence should be contacted to re-evaluate the risk.