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Demolition and Construction Management and Logistics Plan

Dawlish and Scales Road, Haringey

Prepared for Adam Renovations Ltd

By YES Engineering Group Limited

April 2026



Revision History

Revision N°	Prepared By	Description	Date
01	J Willis	Updated to address LBH Highways comments dated 28/04/2026 Updated to address Pollution Officer Comments in email dated 29/04/2026 which requested a Dust Risk Assessment – this is presented at Appendix B.	30 th April 2026

Document Acceptance

Action	Name	Signed	Date
Prepared by	P Willis		April 2026
Reviewed by	K Backhouse		April 2026
Approved by	K Backhouse		April 2026
on behalf of	YES Engineering Group Ltd		

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Landowner	Haringey council
Site Manager	Ian Butler – Adam Renovations Ltd

DCMLP Produced by:		
Name	Signature	Date
P Willis	<i>P. Willis</i>	April 2026
CLP Practitioner (No. A00302) Accreditation Date		04/11/2021
DCMLP Reviewed by:		
Name	Signature	Date
K Backhouse	<i>K Backhouse</i>	April 2026
CLP Practitioner (No. A00301) Accreditation Date		04/11/2021

1 Introduction

1.1.1 YES Engineering Group Ltd was appointed by Adam Renovations Ltd to produce a Demolition and Construction Management and Logistics Plan (DCMLP) to discharge planning conditions 10 and 16 for the consented residential development (reference HGY/2022/2000) at the corner of, Dawlish Road and Scales Road, London, N17 9HN ("the Site").

1.1.2 Planning Condition 10 to be discharged reads as follows:

Condition 10:

Demolition works shall not commence within the development until:

a Demolition Environmental Management Plan (DEMP) has been submitted to and approved in writing by the local planning authority whilst;

b. Development shall not commence (other than demolition) until a Construction Environmental Management Plan (CEMP) has been submitted to and approved in writing by the local planning authority.

The following applies to both Parts a and b above:

a) The DEMP/CEMP shall include a Construction Logistics Plan (CLP) and Air Quality and Dust Management Plan (AQDMP).

b) The DEMP/CEMP shall provide details of how demolition/construction works are to be undertaken respectively and shall include:

ii. Details of working hours, which unless otherwise agreed with the Local Planning Authority shall be limited to 08.00 to 18.00 Monday to Friday and 08.00 to 13.00 on Saturdays;

iii. Details of plant and machinery to be used during demolition/construction works;

iv. Details of an Unexploded Ordnance Survey;

v. Details of the waste management strategy;

vi. Details of community engagement arrangements;

vii. Details of any acoustic hoarding;

viii. A temporary drainage strategy and performance specification to control surface water runoff and Pollution Prevention Plan (in accordance with Environment Agency guidance);

ix. Details of external lighting; and,

x. Details of any other standard environmental management and control measures to be implemented.

c) The CLP will be in accordance with Transport for London's Construction Logistics Plan Guidance (July 2017) and shall provide details on:

i. Dust Monitoring and joint working arrangements during the demolition and construction work;

ii. Site access and car parking arrangements;

iii. Delivery booking systems;

iv. Agreed routes to/from the Plot;

v. Timing of deliveries to and removals from the Plot (to avoid peak times, as agreed with Highways Authority, 07.00 to 9.00 and 16.00 to 18.00, where possible); and

vi. Travel plans for staff/personnel involved in demolition/construction works to detail the measures to encourage sustainable travel to the Plot during the demolition/construction phase; and

vii. Joint arrangements with neighbouring developers for staff parking, Lorry Parking and consolidation of facilities such as concrete batching.

d) The AQDMP will be in accordance with the Greater London Authority SPG Dust and Emissions Control (2014) and shall include:

- i. Mitigation measures to manage and minimise demolition/construction dust emissions during works;*
- ii. Details confirming the Plot has been registered at <http://nrmm.london>;*
- iii. Evidence of Non-Road Mobile Machinery (NRMM) and plant registration shall be available on site in the event of Local Authority Inspection;*
- iv. An inventory of NRMM currently on site (machinery should be regularly serviced, and service logs kept on site, which includes proof of emission limits for equipment for inspection);*
- v. A Dust Risk Assessment for the works; and*
- vi. Lorry Parking, in joint arrangement where appropriate.*

Additionally, the site or Contractor Company must be registered with the Considerate Constructors Scheme. Proof of registration must be sent to the Local Planning Authority prior to any works being carried out.

Reason: To safeguard residential amenity, reduce congestion and mitigate obstruction

1.1.3 Planning Condition 16 to be discharged reads as follows:

Condition 16

No development shall take place, including any works of demolition, until a Method of Construction Statement, to include details of:

- a) parking and management of vehicles of site personnel, operatives and visitors;*
- b) loading and unloading of plant and materials*
- c) storage of plant and materials;*
- d) programme of works (including measures for traffic management);*
- e) provision of boundary hoarding behind any visibility zones; and*
- f) wheel washing facilities,*

have been submitted to and approved in writing by the Local Planning Authority. Only the approved details shall be implemented and retained during the demolition and construction period.

Reasons: To ensure there are no adverse impacts on the free flow of traffic on local roads and to safeguard the amenities of the area consistent with Policies T4, T7 and D14 of the London Plan 2021, Policies SP0 of the Haringey Local Plan 2017 and with Policy DM1 of The Development Management DPD 2017.

1.1.4 The approved Site layout plan is included as the architects' plan attached at **Appendix A**.

1.2 DCMLP Objectives

1.2.1 The objectives of the DCMLP are:

- Enhance safety around Dawlish and Scales Road - Improved vehicle and road user safety
- Reduce congestion around Dawlish and Scales Road - Reduced trips overall, especially in peak periods
- Minimise impact on the road network adjacent to the Site (Dawlish and Scales Road)
- Minimise impact on vulnerable road users on Dawlish and Scales Road during network peak and school peak times
- Ensure pedestrian safety on adjacent footways along Dawlish and Scales Road.

- Minimise Environmental Impacts associated with the construction of the development.
- To demonstrate that the project can be delivered without negatively impacting surrounding residential receptors.
- To ensure that appropriate environmental management practices are followed during the demolition and construction phase of the project.

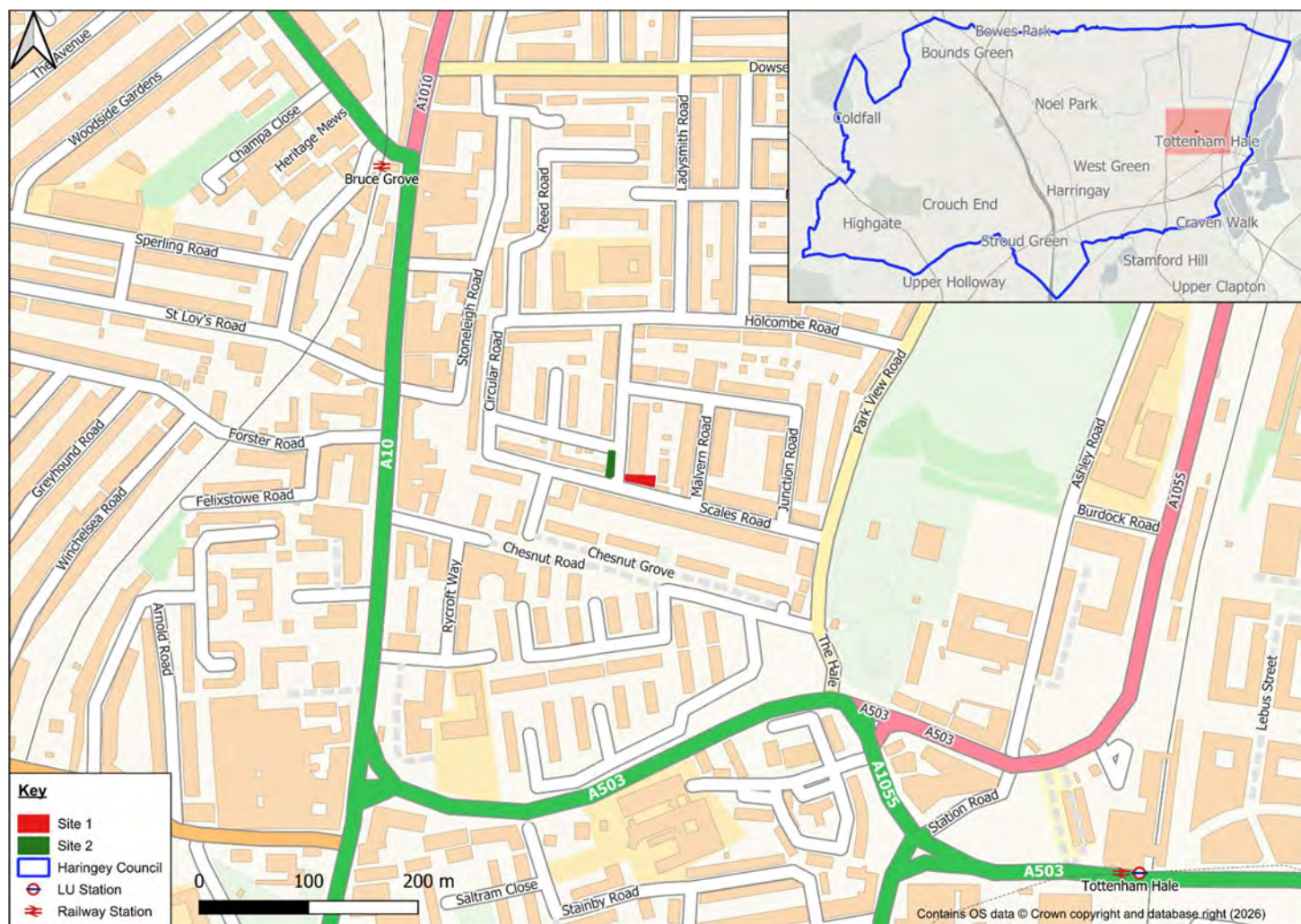
To support these objectives, the DCMLP aims to:

- Encouraging construction workers to travel to the Site by non-car modes
- Promote smarter operations that reduce the need for construction travel or that reduce or eliminate trips in peak periods
- Encouraging greater use of sustainable freight modes
- Encouraging the use of greener vehicles
- Managing the on-going development and delivery of the DCMLP with construction contractors
- Communication of Site delivery and servicing facilities to workers and suppliers
- Encouraging the most efficient use of construction freight vehicles
- Identify the potential environmental impacts and required remedial measures throughout the construction programme including the management of noise, dirt and debris, vibration and dust issues during demolition and construction.
- Commit to adopt and implement the ICE Demolition Protocol and Considerate Contractor Scheme.
- Ensure appropriate Waste Management measures are undertaken including accurate waste identification, separation, storage and identification of registered waste carriers for transportation and disposal to appropriate destinations.
- Managing the on-going development and delivery of the DCMLP with construction contractors
- Communication of Site delivery and servicing facilities to workers and suppliers

1.3 Site Context

- 1.3.1 As shown at **Figure 1.1** overleaf, the site is located to the east of the High Road in Tottenham on the corner of Scales Road and Dawlish Road. The site comprises two corner plots: Site 1 located to the east of Dawlish Road and Site 2 located to the west of Dawlish Road.
- 1.3.2 Both plots fall within the jurisdiction of the London Borough of Haringey (LBH) and the Greater London Authority (GLA).

Figure 1.1 – Location Plan



1.4 Approved Proposals

- 1.4.1 The approved development is for the construction of two new-build residential dwellings (one on each site). Including works to gardens, boundaries, hard and soft landscaping and new street tree planting.

1.5 Principal Contractor

- 1.5.1 The Principal Contractor for the project is Adam Renovation Ltd. The Site Manager will be Ian Butler (Tel: 0208 9972 237).

1.6 DCMLP Structure

- 1.6.1 This DCMLP provides details of the construction arrangements, mitigation measures, implementation and management. The contractor will be responsible for the DCMLP, for developing and updating the DCMLP.

- 1.6.2 The remaining sections of the DCMLP are structured as:

- **Section 2 – Context, Considerations and Challenges** – sets out the relevant policy and guidance and discusses the local transport networks and existing conditions

- **Section 3 – Construction Programme and Methodology** – sets out the construction programme and methodology utilising the TfL spreadsheet
- **Section 4 – Vehicle Routing and Access** – details the proposed vehicle routeing and access taking into consideration CLOCS
- **Section 5 – Planned Measures** – sets out the strategies to reduce impacts to the surrounding road networks
- **Section 6 – Estimated Vehicle Movements** – estimates vehicle movements using the TfL spreadsheet
- **Section 7 – Environmental Management and Mitigation Measures** – Identifies key environmental risks and outlines the mitigation measures that will be employed to manage noise, dust, vibration, and other construction-related impacts.
- **Section 8 – Waste Strategy** – Sets out the procedures for waste management during the works, including reduction, segregation, storage, removal, and compliance with statutory requirements.
- **Section 9 – Implementing, Monitoring and Updating** – Explains how the mitigation measures will be implemented, monitored throughout the project, and updated as necessary in response to changing circumstances or regulatory feedback

2 Context, Considerations and Challenges

- 2.1.1 This section describes the local context and issues identified that need to be considered and addressed during construction.

2.2 Policy Context

- 2.2.1 There are a number of national, regional and local policies that refer to or requirement for a DCMLP to be produced in support of a planning application. This section outlines the relevant national, regional and local transport policy and guidance relevant to the DCMLP.

Traffic Management Act (2004)

- 2.2.2 Part 2 of the Traffic Management Act (2004), highlights the duty of local traffic authorities in managing road networks within their ownership; including the efficient use of the local network as well as their ability to adopt measures when necessary to avoid the occurrence of heavy traffic congestion.
- 2.2.3 Part 5 of the Traffic Management Act (2004) similarly outlines this responsibility, but highlights the extent to which local authorities in Greater London should seek to avoid, eliminate and reduce disruptions which have negative implications on neighbouring authorities. Local authorities within London are encouraged to plan and act on their management duties in the interest of ensuring traffic can move freely and smoothly through their roads, and onwards to the roads of neighbouring traffic authorities without overwhelming the network. This includes the role that Transport for London (TfL) holds in managing the Greater London route network.

National Planning Policy for Waste

- 2.2.4 The Department for Communities and Local Government (LCLG) promotes the need to use a waste hierarchy whereby waste planning authorities should always try to ensure that waste is managed by the best possible environmental means, represented by the highest levels of the hierarchy i.e. waste reduction, re-use and recycling. Therefore, this puts further emphasis on the need for construction to be reusing and recycling as much as possible.

Waste Management for England (2013)

- 2.2.5 The guidance in the Waste Management for England sets out to recover at least 70% waste by weight, of non-hazardous construction and demolition waste by 2020 and for joint government and industry to halve construction, demolition and excavation waste to landfill compared with the 2008 baseline.

National Planning Policy Framework (2024)

- 2.2.6 The National Planning Policy Framework (NPPF) (2024) includes the promotion of sustainable transport throughout the UK in the interest of contributing to national economic, social and environmental objectives. This framework ensures that transport is provided to support the development of strong and vibrant communities, as well as to protect and enhance the natural and built environment. In addition to the promotion of sustainable transport, the framework also highlights the benefits of safe road design in creating a high-quality built environment, and the efficient delivery of goods and services to aid economic growth.

The London Plan (2021)

- 2.2.7 The London Plan was formally adopted in March 2021. The London Plan is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth.
- 2.2.8 The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough's Local Plans must be in 'general conformity' with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out.

Policy T7 (G) – Deliveries, servicing and construction states *'Development proposals should facilitate safe, clean, and efficient deliveries and servicing. Provision of adequate space for servicing, storage and deliveries should be made off-street, with on-street loading bays only used where this is not possible. Construction Logistics Plans and Delivery and Servicing Plans will be required and should be developed in accordance with Transport for London guidance and in a way which reflects the scale and complexities of developments'*.

Policy T7 (K) – Deliveries, servicing and construction states *'During the construction phase of development, inclusive and safe access for people walking or cycling should be prioritised and maintained at all times'*.

Commentary in paragraph 10.7.4 provides guidance on the planning of freight movements, and states *'development proposals should demonstrate through Construction Logistics Plans and Delivery and Servicing Plans that all reasonable endeavours have been taken towards the use of non-road vehicle modes'*.

Commentary in paragraph 10.7.6 states *'Construction Logistics and Delivery and Servicing Plans should be developed in line with TfL guidance and adopt the latest standards around safety and environmental performance of vehicles to ensure freight is safe, clean and efficient. To make the plans effective they should be monitored and managed throughout the construction and operational phases of the development.'*

Commentary in paragraph 10.7.7 states *'To reduce the road danger associated with the construction of new development and enable the use of safer vehicles, appropriate schemes such as CLOCS (Construction Logistics and Community Safety) or equivalent and FORS (Fleet Operator Recognition Scheme) or equivalent should be utilised to plan for and monitor site conditions. Development proposals should demonstrate 'good' on-site ground conditions ratings or the mechanisms to reach this level, enabling the use of vehicles with improved levels of driver direct vision. To support the procurement of these vehicles and to minimise road danger, the Mayor has introduced his Direct Vision Standard, which rates Heavy 437. Goods Vehicles on a star rating from 0 (lowest) to 5 (highest), based on how much the driver can see directly through the cab windows.'*

Control of Pollution and Noise from Demolition & Construction Sites (May 2008)

- 2.2.9 This Code of Practice has been prepared to help developers and their contractors ensure that they undertake their works in the most considerate manner, in order to reduce the impact of the work on local communities. The purpose of this Code of Practice is to ensure that disturbances due to noise, vibration, dust and smoke arising from demolition and construction works on all building sites, including the Public Highway, are kept to an acceptable level without the imposition of unnecessary or unduly onerous restrictions on contractors.

2.3 Context Maps

Regional Context Plan

- 2.3.1 **Figure 2.1 – Regional Context Plan** which is presented at the rear of this document at a scale of 1:35,000 (in accordance with CLOCS guidance) shows the location of the Site in the context of distributor roads, cycle routes, waterways, railways and other key infrastructure.

Local Context Plan

- 2.3.2 A Local Context Plan at a scale of 1:2,500 (as stipulated in the CLOCS guidance) showing the local road network of the Site, footways, cycle routes, stations, bus stops, road markings, etc. to the rear of this document as **Figure 2.2**. This plan shows community considerations such as schools, and other public buildings that could be affected by the construction of the development.

Site Boundary Plan

- 2.3.3 **Figure 2.3 – Site Boundary Plan** is presented to the rear of this document at a scale of 1:500 and shows the area surrounding the Site boundary in more detail. This includes the extent of footways, road markings and other features pertinent to the Site.

2.4 Highways, Carriageways and Footways

- 2.4.1 Scales Road is a short residential street in Haringey within the residential area of Tottenham. The road is characterised by traditional terraced residential properties fronting directly onto the highway. It comprises a single two-way carriageway with an approximate width of around 6 m, allowing two cars to pass but with movement occasionally constrained by on-street parking. Footways are present on both sides of the carriageway, providing pedestrian access along the street. Parking is restricted to permit holders only Monday to Friday between the hours of 8.30am to 6.30pm on street along both sides of the carriageway.
- 2.4.2 Dawlish Road similarly comprises a two-way single carriageway, typically around 6 m in width, with continuous footways on both sides facilitating pedestrian movement along the street. Land use along the road is predominantly residential, with terraced housing fronting directly onto the highway and permit holder on-street parking along sections of both kerbs. Traffic flows are generally low and associated with local access rather than through-traffic.
- 2.4.3 Both roads are subject to 20mph speed limits.

2.5 Sensitive Receptors

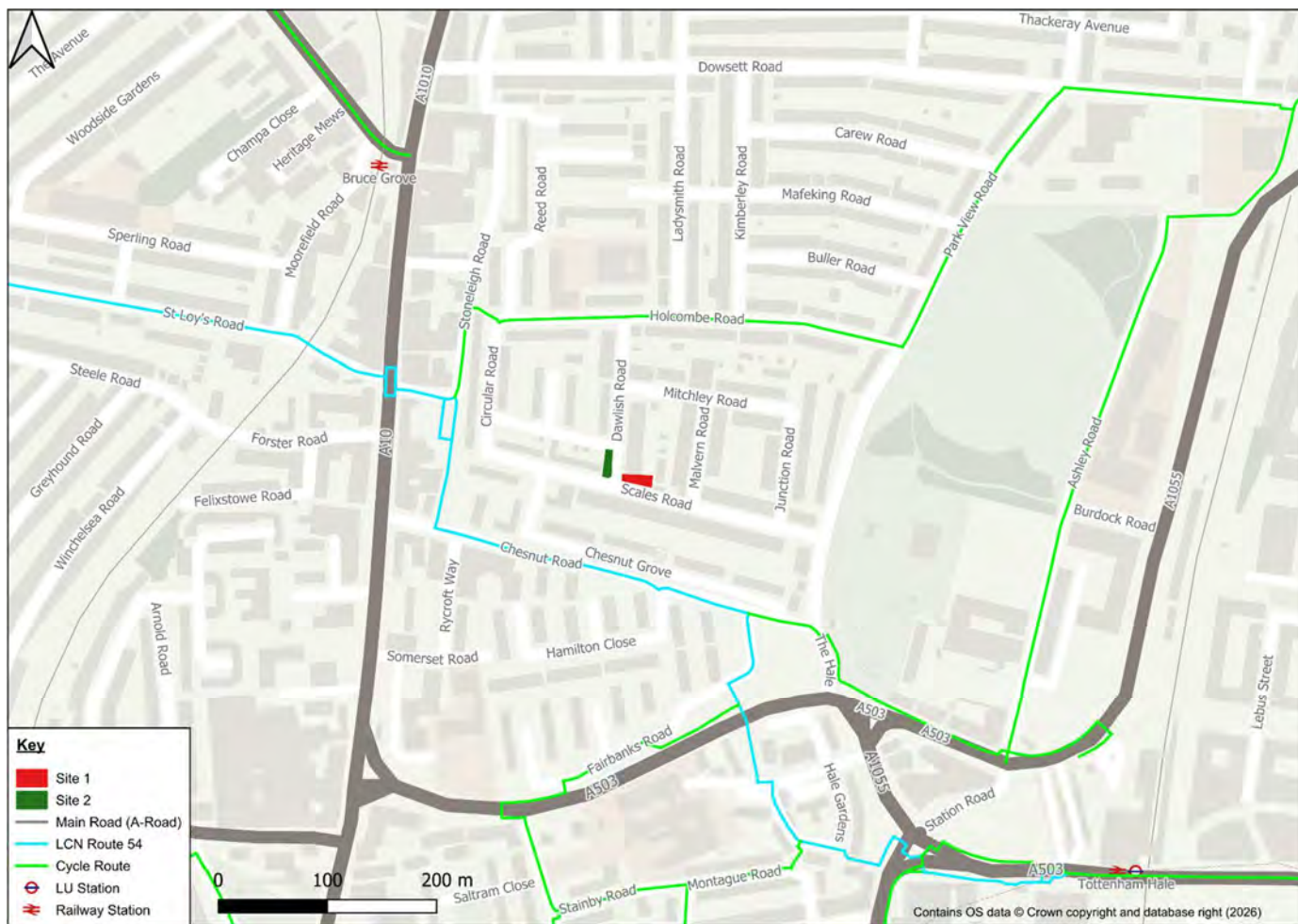
Residential Properties

- 2.5.1 The site is located within an established residential area with residential properties located on all sides of the site for each plot.

Cyclists

As shown in **Figure 2.4** overleaf, dedicated cycle routes including the LCN Route 54 operate on the surrounding roads of Holcombe Road and Chesnut Road. Construction vehicle drivers will therefore be warned to be extra vigilant with respect to cyclists.

Figure 2.4 – Local Cycle Network



Schools, Nurseries and Community Facilities

2.5.2 Hyland House School (independent) is located off Holcombe Road, approximately 150 m to the north-east of the site, on the agreed construction vehicle route. There are no other schools or nurseries in the immediate vicinity of the site or along the proposed construction routes. To safeguard children, parents and carers travelling to and from the school, all construction vehicle movements (deliveries to and waste collections from the site) will be specifically scheduled to avoid the school's drop-off and pick-up periods of 08.00–09.15 and 15.00–16.15 on school days. The Site Manager will obtain the school's term dates and INSET days at the start of the project, will update them each term, and will brief the Traffic Marshalls and the booking system operator accordingly.

2.5.3 TUEG UK - Terreiro de Umbanda Estrela Guiada religious facility is located 30m west of the site along Scales Road however opening times of this facility are during the evenings and weekends so are unlikely to be affected by the proposed works at the site.

Community Liaison Officer

2.5.4 A Community Liaison Officer will be appointed and will have the role of being the point of contact on behalf of the contractor and the developer. It is anticipated that this role will be undertaken by a member of the construction team. The role will encompass liaison with all

and any external parties. The Community Liaison Officer will mitigate and resolve any issues raised by the local community including the public facilities set out above, and by LBH officers.

- 2.5.5 This approach will ensure there is effective communication and as required, collaboration throughout the construction period. This DCMLP has prepared a strategy for preventing potential issues; however, any difficulties encountered during construction will be reported/recorded in a full log and resolved.

3 Construction Programme

3.1 Scope of Works

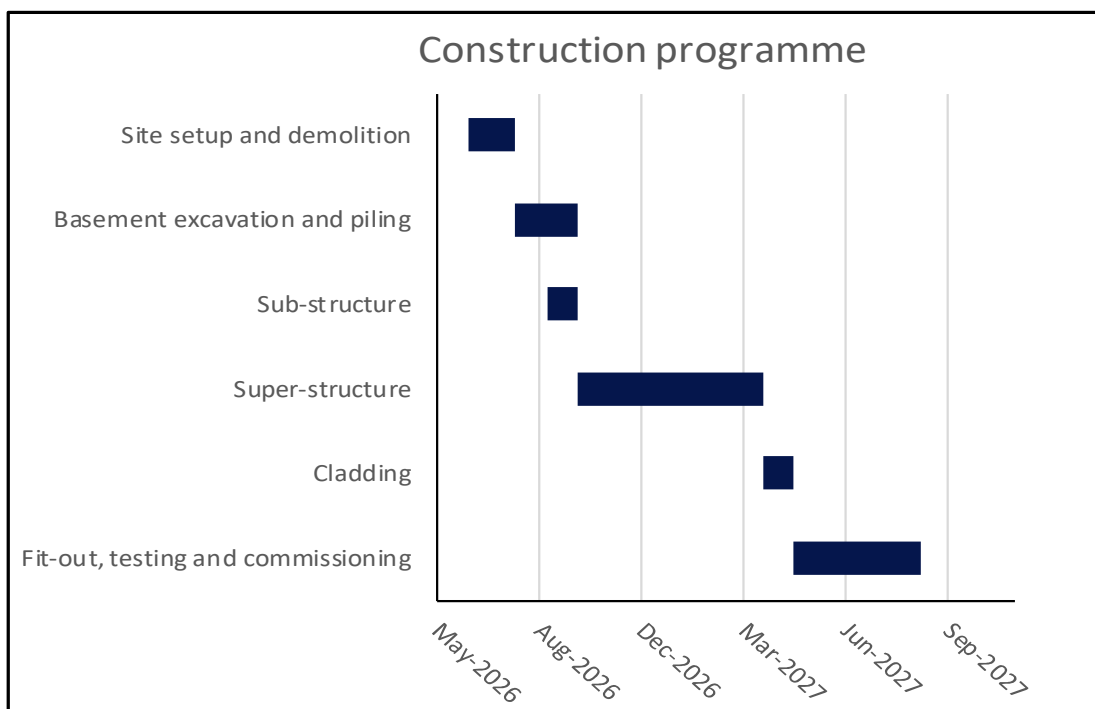
- 3.1.1 The approved development is for the construction of two new-build residential dwellings (one on each site). Including works to gardens, boundaries, hard and soft landscaping and new street tree planting. The architects' approved layout plan is attached as **Appendix A**.

3.2 Construction Programme

The programme of construction for the development has been developed by using data from a similar scale project. Construction is expected to last for approximately 16 months and is anticipated to begin in June 2026. The buildings will be completed and ready for occupancy by September 2027.

- 3.2.1 **Figure 3.1** shows the programme graph and **Table 3.1** provides a high-level breakdown of the program by the key construction stages. Both were prepared using the TfL Construction Logistic Plan toolkit spreadsheet. Please note the 'Basement and Excavation' phase of works will be foundations only.

Figure 3.1 – Construction Programme



- 3.2.2 **Table 3.1** overleaf provide a high-level breakdown of the program by the key construction stages.

Table 3.1 – Construction Programme

Construction phase	Start	End
Site setup and demolition	Jun-2026	Jul-2026
Foundations	Jul-2026	Sep-2026
Sub-structure	Sep-2026	Sep-2026
Super-structure	Oct-2026	Mar-2027
Cladding	Mar-2027	Apr-2027
Fit-out, testing and commissioning	Apr-2027	Sep-2027

3.3 Site Set Up and Demolition

Road/Footway Condition Survey

- 3.3.1 A pre-commencement condition survey of the surrounding highway and footway will be undertaken by the contractor prior to the start of construction works. This survey will document the existing condition of Dawlish Road and Scales Road and the adjacent footway, particularly in the vicinity of the designated loading area. The purpose of the survey is to provide an accurate record of the Site's baseline condition and to ensure that any damage resulting from construction activities can be identified and rectified. Upon completion of the works, the area will be inspected again and reinstated to its original condition, with any necessary repairs carried out at the applicant's expense and in agreement with the local highway authority using a LBH approved contractor.

Applying for Licenses

- 3.3.2 Prior to the commencement of any works on site, the contractor will obtain all necessary permits and licences from the London Borough of Haringey. All required approvals will be secured prior to the start of construction activities. These may include, but are not limited to, licences for the placement of skips on the carriageway or footway, as well as permits for any temporary hoarding, scaffolding, or other structures located outside the site's red line boundary.

Applying for Licenses

Site Set up Activities

- 3.3.3 At the start of the construction programme the following Site set up activities will be undertaken on each plot:
1. 2.4m minimum height hoarding will be erected around the front of the Site to prevent public access and protect adjacent landowners and the general public from construction activity. Hoarding will comprise plywood faced, timber-framed boundary hoarding with a density of not less than 7.5 kg/m², for security, noise and dust control. Hoardings will be frequently inspected and repaired and repainted as necessary by the contractor. Cleaning of hoardings will only take place during normal working hours. Any offensive graffiti will be removed as quickly as practicably possible.
 2. Set up hoarding display publicity material including information on the Site programme, the telephone contacts for complaints and/or enquiries, the name of the Site manager (daytime) and an emergency out of hours contact. Signs to indicate any changes to pedestrian/cycle routes around the Site will also be displayed.

3. Set up a secure pedestrian and cycle access gate into the Site. All access gates onto the Site will be designed and installed to open inwards (into the Site) so that, when in use, they do not swing onto, project across, or otherwise obstruct the public footway or carriageway on Dawlish Road or Scales Road
4. An absolute minimum clear footway width of 1.2 m will be maintained at all times along the public footways abutting the Site on Dawlish Road and Scales Road, including during deliveries, loading and unloading, and the placement of any temporary footway ramps. This is to ensure that pedestrians, including wheelchair users and those with pushchairs or buggies, can continue to use the footway without obstruction or detour. Where the available footway width would otherwise fall below 1.2 m, deliveries will be paused under the supervision of the Traffic Marshalls and pedestrians prioritised.
5. All hoarding, scaffolding, advance warning signage, footway ramps and any other temporary structures will be positioned so as to maintain this minimum clear footway width of 1.2 m and to provide an unobstructed, level pedestrian thoroughfare suitable for wheelchair and buggy users at all times.
6. Set up security measures around the Site to prevent unauthorised entry to or exit from the Site. Any security alarms used will follow HSE requirements and comply with BS EN 50131 1-3 as appropriate. The security of neighbouring property will also be considered. Any Site security cameras, where used, will be sited in locations that will not cause offence to off-site local residents or businesses, e.g. not look directly into private premises windows/gardens off site.
7. Identify the existing incoming services and isolate the nearest stop cock, valve or meter within the Site boundary.
8. Set up Site welfare facilities within the site.

3.3.4 Demolition of the existing garages at Site 1 will be undertaken by handheld power tools. Demolition material will be stockpiled within the site and removed via grab lorries or skips.

3.4 Construction

3.4.1 Foundations – Once the existing oversite is cleared, the foundations will be constructed. Strip foundations with concrete pours will be constructed below ground to support the new buildings. Concrete lorries will stop adjacent to the site along Dawlish Road and Scales Road (discussed in further detail at Section 4) and concrete will be pumped into the site. Ramps will be placed across the footway to mitigate against trip hazards. Concrete pumping operations are anticipated to take place on a small number of discrete days during the foundations and sub-structure phases (estimated to be no more than 6 pours in total across both plots, each lasting approximately 1 hour from the lorry arriving on street to the lorry departing). Each pour will require the temporary suspension of one to two CPZ parking bays (The Hale CPZ) immediately adjacent to the relevant plot to accommodate the concrete lorry and concrete pump. The contractor will apply to the London Borough of Haringey for the necessary parking bay suspension permits at least 10 working days in advance of each pour, and will display advance notice on the affected bays in accordance with LBH's standard requirements. Pours will be scheduled outside school drop-off and pick-up times and outside Tottenham Hotspur Stadium event days where reasonably practicable. On completion of each concrete pour, the Site Manager (or Traffic Marshall on their behalf) will undertake an immediate visual inspection of the footway and carriageway in the vicinity of the pour. Any concrete spillage, splashes, residue or other debris will be washed down with clean water and removed before the area is reopened, using appropriate containment measures to prevent any wash-water entering surface water drains. The inspection and any clean-up activities will be recorded in the site log.

- 3.4.2 Sub-structure – Sub-structure works will include the installation of all drainage groundworks. The slab and core will be formed of concrete. Any waste and excavation arisings will be stockpiled at the front of the site and removed using grab lorries or skips. If a skip is required on the footway for any part of the build then the contractor will apply for the relevant licence.
- 3.4.3 Super Structure - The super structure superstructure will be constructed as a traditional brick/block with internal timber stud walls.
- 3.4.4 Scaffolding will need to be erected at the new buildings once the walls exceed a workable height. Appropriate licences will be applied for by the contractor if any scaffolding is required outside of the red line boundary of each plot. Efficient construction materials will be used throughout the build.
- 3.4.5 Cladding - All external brick / blockwork will commence upon areas being completed in a controlled logistical manner.
- 3.4.6 Fit-out, Testing and Commissioning - The proposed works for the fit-out, testing, and commissioning stage will involve completing all internal elements of the development to a high standard. Internal Mechanical and Electrical works will follow with 1st then 2nd fix as well as all joinery / dry-lining and painting works. External windows and doors will also be fitted as well as roofing works to make the building watertight.
- 3.4.7 Testing and commissioning of all systems, including mechanical, electrical, and plumbing installations, will be carried out to ensure full compliance with relevant standards and regulations. This process will take place prior to the final handover inspection by Building Control, ensuring that all aspects of the development meet the required quality and performance standards. Final handover will only proceed once these conditions are fully met.

4 Vehicle Routeing and Access

4.1 Construction Routing Strategy

- 4.1.1 All delivery vehicles will be required to access the Site using the primary road network on roads which are suitable for construction traffic. All vehicles will approach from the north via the A1010 and turn east onto Dowsett Road. Vehicles will then turn south onto Ladysmith Road, west on to Holcombe Road then south onto Dawlish Road to access the temporary loading bay on the eastern side of Dawlish Road, located between the 2 plots.
- 4.1.2 To exit, vehicles will pull out of the temporary loading bay in a forward gear and turn west onto Scales Road and follow the road round to the north to rejoin Holcombe Road and retrace their steps back to the A1010.
- 4.1.3 In accordance with TfL CLOCS CLP guidance **Figure 4.1** and **Figure 4.2** attached at the rear of this document show the routing strategy in regional and local contexts.
- 4.1.4 Vehicle tracking of the proposed construction vehicle routes is shown on and **Figure 4.3** attached at the rear of this document. The largest size vehicle which can safely manoeuvre through the residential roads is an 8m Lorry. Therefore, all deliveries/waste collection will be restricted to vehicles <8m in length. It is the contractor's responsibility to inform all suppliers of these requirements.
- 4.1.5 Construction vehicle drivers are expected to telephone ahead to confirm their delivery slot so Traffic Marshalls will be ready to oversee the vehicle movement into the temporary loading bay and subsequent transfer of materials into each plot. The delivery slot booking mechanism will operate as follows. The Site Manager will maintain a delivery booking diary in 30-minute slots, available between 10.00 and 16.00 Monday to Friday and (where Saturday working is required) between 09.30 and 13.00. All deliveries to the Site, and all waste collections from the Site, must be booked into a slot in advance by the relevant sub-contractor or supplier. Only one vehicle will be permitted to occupy the temporary loading bay at any one time, and no two slots will be issued for the same time period; this prevents any possibility of an excess of deliveries arriving simultaneously. School drop-off and pick-up periods (08.00–09.15 and 15.00–16.15 on school days) will be blocked out in the booking diary and no deliveries will be scheduled within these windows. Drivers will be required to telephone the Site Manager when approximately 15 minutes from the Site to confirm their imminent arrival; the Traffic Marshalls will then be deployed to the loading bay. Where a driver arrives early, they will be instructed to wait off the local road network (for example, in a layby on the A1010 or other suitable holding location agreed in advance) until the booked slot is due. Late arrivals will, where possible, be re-slotted into the next available slot on the same day; if no slot remains available, the delivery will be re-booked for the following working day. Unexpected or unbooked deliveries will not be accepted at the Site – the Traffic Marshalls will turn such vehicles away and the Site Manager will follow up with the relevant sub-contractor to ensure compliance with the booking system. Drivers will not be permitted to wait on Dawlish Road, Scales Road, Holcombe Road, Ladysmith Road or Dowsett Road in any circumstances. The booking diary will be reviewed by the Site Manager at the end of each working day and any breaches recorded; persistent non-compliance by a sub-contractor or supplier will result in formal escalation by the Principal Contractor.
- 4.1.6 The developer is committed to ensuring that the construction vehicle access strategy will not impact on the existing operation or capacity of the residential roads or wider local road network.

4.2 Access

4.2.1 Construction Vehicle Access

4.2.2 Vehicles will approach the site from the north along Dawlish Road where they will stop outside the site frontage under the supervision of trained traffic marshals to access the temporary loading bay. The loading bay will be positioned to ensure a minimum passing width of 3m is always present along Dawlish Road to allow the free flow of traffic and is positioned in a convenient location to access each plot of land.

4.2.3 Advance warning signage along Dawlish Road and Scales Road will be installed to alert both pedestrians and motorists to the temporary loading bay. All deliveries will be undertaken under controlled conditions to ensure the safety of all road users, including pedestrians, cyclists, and motorists, while reducing disruption and maintaining safe and consistent traffic flow throughout the works. Traffic Marshalls may temporarily halt deliveries to allow pedestrians to pass safely.

4.2.4 The swept path analysis, shown in **Figure 4.3**, confirms that an 8-metre rigid vehicle—the largest to service the Site, can safely enter and exit the designated loading area on Dawlish Road in a forward gear.

4.2.5 In addition, and to address comments received from the London Borough of Haringey Transport Planning team, an updated swept path analysis is provided as **Figure 4.4** demonstrating that, whilst the temporary loading bay is occupied by an 8-metre rigid delivery vehicle (the largest vehicle servicing the Site), a fire tender is able to safely transit Dawlish Road and Scales Road past the loading bay. The minimum 3 m passing width referred to above is sufficient to accommodate a fire tender alongside a stationary 8-metre rigid vehicle. The actual carriageway passing width is 3.76m as shown in **Figure 4.4**. The Traffic Marshalls will, in any event, be present at all times when the loading bay is occupied and have authority to immediately move the delivery vehicle on, or stop the loading/unloading operation, in the event that emergency-service access is required.

Pedestrian and Cycle Access

4.2.6 Pedestrian and cycle access to the Site will be provided by a secure gated entrance for each plot.

Parking and Management of Vehicles of Site Personnel

4.2.7 There is no parking available on-site. All personnel, contractors, and visitors are encouraged to use sustainable travel methods, such as walking, cycling, or public transport, to access the Site. Alternative parking arrangements must be made at legal kerbsides or within permitted car parking areas at the individual's expense. It is the responsibility of individuals to ensure compliance with local parking regulations when accessing the Site.

4.2.8 Lorry parking will take place as shown on **Figure 4.3** within the temporary loading bay for short durations for loading and unloading activities only for a maximum duration of 30 minutes. The 30-minute maximum dwell time will be enforced by the Site Manager and the on-duty Traffic Marshall. The arrival time of each vehicle entering the loading bay will be logged in the delivery booking diary (date, time in, vehicle registration, company and goods/plant) and the departure time recorded on the vehicle's exit. Drivers will be informed of the 30-minute limit at the point of booking and again on arrival on Site. The Traffic Marshall will issue a verbal reminder to the driver at the 25-minute mark; if a vehicle is approaching the 30-minute limit, the driver and the receiving sub-contractor will be instructed to expedite remaining loading or

unloading. In the rare event that a delivery requires longer than 30 minutes, this must be agreed with the Site Manager in advance at the point of booking and accommodated through a longer scheduled slot rather than overrun. Any overruns will be recorded as a breach in the site log; persistent breaches by a particular supplier or sub-contractor will result in formal escalation by the Principal Contractor and, where appropriate, removal of that supplier or sub-contractor from the approved delivery list.

Materials Storage and Security

- 4.2.9 All plant and materials will be stored on-site when not in immediate use and will be secure against vandalism and theft. Where this is not possible alternative arrangements off-site will be made to ensure they do not affect any of the adjacent footways or carriageways. No materials or plant will be stored on the public highway. All plant and materials in connection with the development should be stored within the private hoarding or at another private (off public highway location).
- 4.2.10 On-site tool storage will be provided where possible to reduce the number of vehicle journeys to Site. If possible, the storage location will be insured for contractors' tools as well as supplied tools, to help reduce of potential vehicle journeys to Site.

Deliveries

- 4.2.11 Space will be allocated on Site for all deliveries and supplies, as illustrated in **Figure 4.3**. Efforts will be made to recycle as much waste as possible. To minimise trips, vehicles delivering materials to the Site will, whenever possible, depart with waste materials.

Co-ordination with Neighbouring Developments

- 4.2.12 A review of the London Borough of Haringey planning portal was undertaken to identify whether any neighbouring sites have extant planning permissions or live planning applications that could result in overlapping construction activity with the proposed development. The review indicates that number 10 Dawlish Road had permission granted in 2023 for a single storey 6m extension however it appears these works are already completed. There are currently no further applications within the immediate vicinity that would require coordination at this stage.
- 4.2.13 Should any nearby development come forward during the construction period, the contractor will liaise with the relevant parties to coordinate construction activities where practicable, including the potential consolidation or scheduling of deliveries, in order to minimise disruption to the surrounding highway network and local residents.

5 Strategies to Reduce Impacts

- 5.1.1 It is recommended that the following measures are introduced during construction period. The contractor should discuss and agree the implementation of the below measures with LBH.

5.1 Planned Measure Checklist

- 5.1.1 **Table 5.1** sets out the committed, proposed and considered mitigation measures checklist for the approved development which is classified as a Medium Impact Site.

Table 5.1 – Committed, Proposed and Considered Mitigation Measures

Number	Committed	Proposed	Considered
Measures influencing construction vehicles and deliveries			
Safety and environmental standards and programmes	X		
Adherence to designated routes	X		
Delivery scheduling	X		
Re-timing for out of peak deliveries	X		
Re-timing for out of hours deliveries			X
Use of holding areas and vehicle call off areas			X
Use of Construction Consolidation Centres			X
Vehicle Choice			X
Use of waste compactors to reduce waste vehicle movements			X
Measures to encourage sustainable travel			
Freight By Water			X
Freight by Rail			X
Material procurement measures			
DfMA and off-site manufacture			X
Re-use of material on site			X
Smart procurement	X		
Other measures			
Collaboration amongst other sites in the area	X		
Implement staff travel plan	X		
Prevention of HGV movements during the school drop off/ pick up time	X		

5.1.2 Each of the mitigation measures are discussed in turn below.

5.2 Hours of Construction

5.2.1 Working hours will be agreed with LBH, will be (as set out in planning condition 10):

- Monday – Friday: 8am – 6pm
- Saturday: 8am to 1pm
- Sundays and Bank Holidays the Site would be closed

5.3 Measures Influencing Construction Vehicles and Deliveries

Safety and Environmental Standards and Programmes

- 5.3.1 The developer is committed to ensuring all contractor and sub-contractor vehicles arriving at the Site comply with sufficient safety measures and requirements relating to Work Related Road Risk.
- 5.3.2 All vehicles and driver management practices to comply with the FORS (minimum Silver accreditation) and Construction Logistics and Community Safety (CLOCS).
- 5.3.3 A collision reporting system will be mandated to ensure all collisions and accidents involving the projects' vehicle and drivers are reported to the Project/ Site Manager and any relevant parties.
- 5.3.4 The Site will be registered with the Considerate Constructors Scheme.

Adherence to Designated Routes

- 5.3.5 All drivers arriving at the Site will be expected to follow the Routeing Plan set out in **Figure's 4.1 and 4.2** of this DCMLP. All drivers will be provided with the plan of the routes to follow.

Delivery Scheduling

- 5.3.6 To minimise any potential impacts from the delivery of or collection of materials, it is recommended that the following measures are introduced during construction:
- Implementation of a timed delivery schedule between the hours of 10am and 4pm Monday to Friday and 09.30 to 13.00 on Saturdays to avoid peak network hours. The developer commits that no construction vehicle movements (deliveries to or waste collections from the Site) will be scheduled during the school drop-off and pick-up periods of 08.00–09.15 and 15.00–16.15 on school days, in order to safeguard pedestrian safety in the vicinity of Hyland House School (located off Holcombe Road, on the agreed construction vehicle route) and to reflect the commitment shown at Table 5.1 to prevent HGV movements during school drop-off and pick-up times. These periods will be blocked out in the delivery booking diary maintained by the Site Manager.
 - This Site will operate a material delivery scheduling and booking system to ensure that congestion is avoided on the surrounding highway. Each delivery will be allocated a delivery time period and an area will be in place, on-site from which to load or unload.

- Only one delivery will be permitted to visit the Site at any one time
- "Just in Time" scheduling of deliveries will be used to minimise storage capacity required. To mitigate the risk of supply chain issues disrupting the Just-in-Time approach, the contractor will: (i) maintain a small contingency stock of critical materials within the Site hoarding line where space permits; (ii) order long-lead-time items further in advance; (iii) where possible, dual-source critical materials from more than one supplier; and (iv) maintain regular communication with key suppliers to receive early warning of potential delays. In the event of a supply chain disruption that would otherwise result in unscheduled or out-of-slot deliveries, the Site Manager will re-sequence the delivery booking diary so that any catch-up deliveries are accommodated within the existing booking framework (one vehicle per slot, no more than the daily peak of 2 HGV movements forecast in Section 6, and outside school drop-off/pick-up times). Under no circumstances will Just-in-Time pressures be used to justify departing from the agreed delivery hours, the booking system, or the school-time exclusions
- Areas will be identified within the individual Sites for the storage of plant and materials throughout the course of construction.
- Given that vehicles will not enter the Site, it is not anticipated that dirt and debris on delivery vehicles wheels could potentially be transported onto the public highway. It is therefore considered unnecessary that the contractor should consider the provision of a wheel wash facility. Road sweepers will be deployed as and when required. The Traffic Marshall and/or Site Manager will undertake a visual inspection of the footways and carriageways of Dawlish Road and Scales Road abutting the Site at a minimum frequency of three times per working day – at the start of the working day (before deliveries commence), at midday, and at the end of the working day. Additional inspections will be undertaken immediately after each delivery, after each concrete pour, and following any spillage incident. Where any mud, debris, dust or other material is identified, the area will be swept manually using brooms and cleaning materials kept on Site, or, where the deposit is more substantial, a road sweeper will be called out the same day. The results of all inspections, and any cleaning action taken, will be recorded in the site log and made available to the London Borough of Haringey on request.
- A route for heavy goods vehicles associated with the construction phase has been identified and a route map produced to be provided to the drivers. Deliveries will stop and load on street on Dawlish Road within a designated area.

Re-timing for Out of Peak Deliveries

- 5.3.7 Re-timing out of peak time will aid the operational efficiency of the Site and also the neighbouring area. The developer commits to attempting to re-time as many deliveries as possible out of the peak periods. All deliveries will take place between 10am and 4pm Monday to Friday and 09.30 to 13.00 on Saturdays only.

Re-timing for Out of Hours Deliveries

- 5.3.8 The re-timing for Out of Hours Deliveries will not be appropriate for this Site as it would create an unnecessary disruption to surrounding residents.

Use of Holding Areas

- 5.3.9 Given the scale of the development, the number of deliveries is expected to be low. Therefore, a vehicle holding area is not required.

Use of Construction Consolidation Centres (CCC)

- 5.3.10 Given the scale of the development, and distance to the nearest CCC, it is not proposed that CCC are used or required to support the project.

5.4 Permitted Delivery Hours

- 5.4.1 Where possible deliveries will be restricted to the hours of 10am to 4pm Monday to Friday only to avoid the highway peak hours of 07.00 to 9.00 and 16.00 to 18.00. Saturday deliveries will be avoided where possible, if required they will take place between the hours of 9.30 to 13.00.
- 5.4.2 Vehicles would only travel to and from Site between the hours set out above in order to avoid noise being generated by heavy goods vehicles close to adjacent properties around the Site.
- 5.4.3 The Site will be staffed during the working hours set out above. The contractor will appoint a person who will have responsibility for ensuring adherence to good practice measures. A designated person should be on site at all times to ensure that operations are taking place as planned and should have the necessary authority to initiate changes to work practices and, or mitigation as appropriate.

5.5 Material Procurement Measures

Design for Manufacture and Assembly and off-site Manufacture (DfMA)

- 5.5.1 The potential benefits of off-site fabrication and consolidation are acknowledged and the potential use for off-site fabrication will be reviewed by the contractor.
- 5.5.2 The contractor will consider the appropriate use DfMA as a measure to reduce the impacts of construction. The contractor will be required to assess the potential benefits of the measure based on the delivery schedule, method and materials of construction and size of construction vehicles.

Re-use of Material on-site

- 5.5.3 Where possible any material produced from the demolition period will be re-used on site.

Smart Procurement

- 5.5.4 The contractor will explore local suppliers in the procurement stage to contribute to the local economy. Additionally, the contractor will also explore opportunities to source materials from the same supplier(s) as other developers with sites underway.

5.6 Other Measures

Collaboration

- 5.6.1 As appropriate, the Site Manager will keep in contact with organisations that have an interest in the Site and how the development is progressing. These bodies, groups and individuals include planning and highways authorities, local residents, businesses and community groups.

Staff Travel Plan

- 5.6.2 Most trips to the site will be 'people' trips (i.e. tradesmen/professionals), with a relatively low number of conventional 'deliveries'. The following impact-reduction strategies, achieved through the implementation of a staff Travel Plan, are therefore considered key to the success of this DCMLP.
- 5.6.3 Each subcontractor will be issued with a copy of the staff Travel Plan which covers the following key points:
- No parking is provided on site. Workers will be expected to make their own arrangements via public car parks or legal kerbside parking.
 - Details of public transport and cycle parking for worker journeys
 - All vehicle trips to Site must be booked in advance by phone to the Site Manager
 - Strictly no waiting on local roads
 - Designated routes for vehicles above and below 3.5t
 - Community considerations on designated routes and in the local area generally
 - Requirement for traffic marshals when entering/exiting Site loading area
 - Accident and Near Miss report to be implemented and maintained accordingly
- 5.6.4 Staff, contractors and visitors will not be encouraged to travel by car to the Site and will be expected to make their own travel arrangements.

6 Estimated Vehicle Movements

6.1 Vehicle Types

6.1.1 The number of vehicles accessing the Site has been estimated according for each of the six stages of construction. It is anticipated that the following vehicle types will be required to access the Site:

- Light Goods Vehicles (LGV) 5.5m x 2.5m – dwell time 10 – 20 minutes
- Delivery lorries –maximum size of 8m – dwell time 10 – 20 minutes
- Grab Lorry – 8m – dwell time 10 – 20 minutes
- Concrete Mixer Lorries, maximum size of 8m – dwell time 20 – 30 minutes

6.2 Estimated Construction Vehicles

6.2.1 The number of vehicles that will access the Site has been estimated for each of the six stages of construction and input into the Transport for London (TfL) Construction Logistics Planning Tool (<https://tfl.gov.uk/info-for/urban-planning-and-construction/transport-assessment-guide/guidance-by-transport-type/freight>). Further information on the phases is presented in **Section 3.1. Table 6.1** details the peak number of trips in each phase.

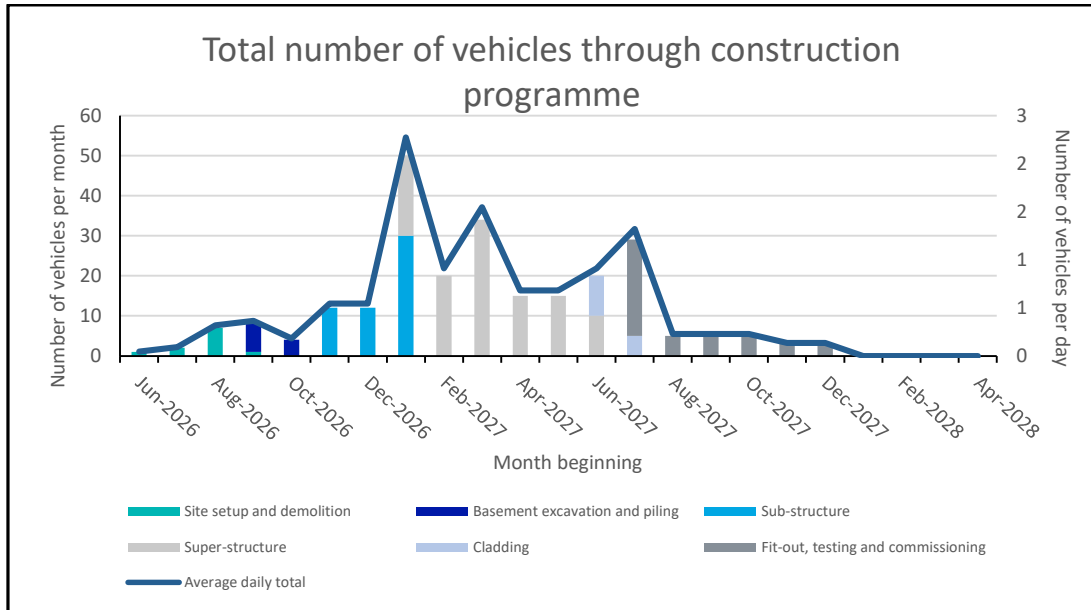
Table 6.1 – Number of Construction Vehicles per Phase

Construction phase	Period of stage	No. of trips (monthly)	Peak no. of trips (daily)
Site setup and demolition	Q2 2026 - Q3 2026	7	0
Foundations	Q3 2026 - Q3 2026	7	0
Sub-structure	Q3 2026 - Q3 2026	30	1
Super-structure	Q4 2026 - Q1 2027	34	2
Cladding	Q1 2027 - Q2 2027	10	0
Fit-out, testing and commissioning	Q2 2027 - Q3 2027	24	1
Peak period of construction	Q1 2027 - Q1 2027	50	2

6.2.2 As shown, the peak number of daily trips is forecast to be 2 vehicles anticipated to visit the Site during any of the phases.

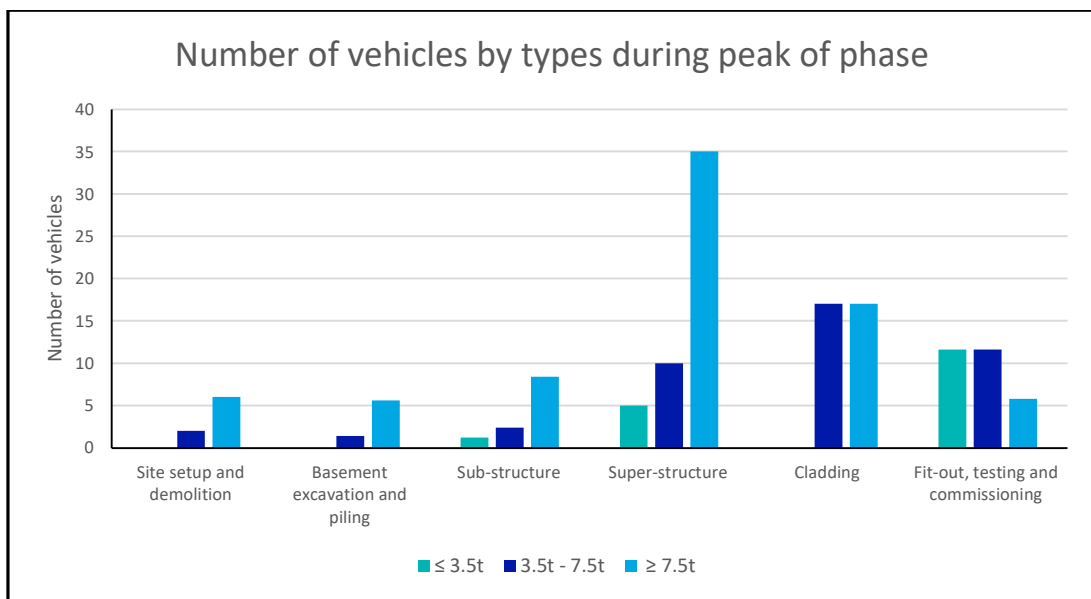
6.2.3 **Figure 6.1** details the estimated number of daily and monthly construction vehicles. This estimate will be refined once the sub-contractors are appointed and the construction programme is finalised. The sub-contractor will provide specific delivery schedule information when appointed.

Figure 6.1 – Estimated Number of Daily and Monthly Construction Vehicles



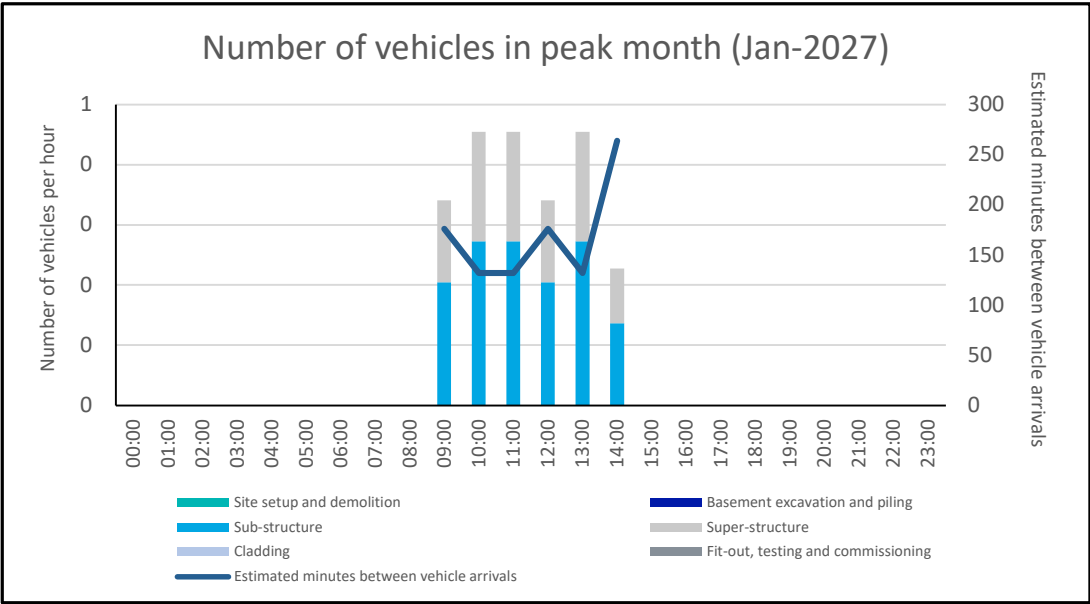
6.2.4 **Figure 6.2** shows the number and sizes of construction vehicles which will be accessing the Site per month during the peak of each phase.

Figure 6.2 – Estimated Number of Vehicles during Peak of Phase



6.2.5 **Figure 6.3** overleaf shows the number of vehicles per hour and the estimated number of minutes between vehicle arrivals during the peak month.

Figure 6.3 – Number of Vehicles in Peak Month



6.2.6 **Figure 6.3** above depicts deliveries between the hours of 9.30am to 3.00pm (outside of peak network and school pick up-drop off hours). The Site delivery times will be subject to 'Just in time delivery' to avoid queues on the local road network and residential roads within the immediate vicinity of the Site.

7 Environmental Management and Mitigation Measures

7.1 Environmental Management

Working Hours

- 7.1.1 The proposed working hours to be agreed with the London Borough of Haringey (LBH) are as follows: Monday to Friday from 8am to 6pm, and Saturday from 8am to 1pm. The Site will remain closed on Sundays and Bank Holidays. Deliveries will be restricted to the hours of 10am and 3pm on weekdays, and 9:30am to 1pm on Saturdays, to minimise disruption to the local community, avoid peak network hours and school times and ensure compliance with planning conditions.

7.2 Mitigation Measures

- 7.2.1 It is recommended that the following measures are introduced during construction period. The contractor will discuss and agree the implementation of the below measures with LBH. Each of the mitigation measures are discussed in turn below.

Mud on public highway:

- 7.2.2 There will be no wheel washing facility at the Site as vehicles will not enter the Site boundary. However, staff equipped with brooms and cleaning materials will be on hand to ensure the surrounding area remains clean and free from debris. All reasonably practicable measures will be implemented to avoid, limit, and mitigate the deposition of mud and other material onto the highway. Road sweepers will be deployed if required. Visual inspections of the footways and carriageway abutting the Site on Dawlish Road and Scales Road will be undertaken by the Site Manager (or Traffic Marshall on their behalf) at a minimum frequency of three times per working day – at the start of the working day before deliveries commence, at midday, and at the end of the working day before the Site is closed down. Additional inspections will be undertaken immediately after each delivery, after each concrete pour and following any spillage incident. Where any mud or other material is identified on the public highway, it will be removed promptly using brooms and cleaning materials, or by calling out a road sweeper where the deposit is more substantial. The results of all inspections, and any cleaning action taken, will be recorded in the site log and made available to the London Borough of Haringey on request.

Noise and Vibration:

- 7.2.3 It is confirmed that a mobile crusher will not be used on Site during the construction programme.
- 7.2.4 The Contractor shall comply with the recommendations and guidance set out in BS5228:2009+A1:2014 at all times.
- 7.2.5 The Best Practicable Means (BPM), as defined in Section 72 of the Control of Pollution Act 1974, shall be employed at all times to reduce noise (including vibration) to a minimum, with reference to the general principles contained in British Standard BS5228: 2009 'Noise and Vibration Control on Construction and Open Sites'. Appropriate noise and vibration trigger and action levels will be set.
- 7.2.6 On-site, good practice procedures will be followed in order to mitigate noise and vibration impacts. Control measures to be adopted will be reviewed and carried out depending on the activities on site. Such measures include, but are not limited to:

- Where using machinery which create noise and vibration, contractor's staff will be trained on Noise and Control on Construction Site and Open Sites as detailed in BS 5228.
- Where possible, only one power tool will be used on-site at any one time.
- Noise control will primarily be dealt with at source.
- Mechanical plant and equipment will be selected and specified taking its noise profile into consideration.
- All plant will be of modern design and manufacture to benefit from up to date developments in technology for noise reduction.
- Where possible, electrically driven plant will be used.
- If however, petrol or diesel powered plant is required, then this plant will be properly maintained and checked regularly.
- Appropriate acoustic baffles will be fitted to air intake and exhaust systems. Stationary equipment, such as compressors will be fitted with shields to mitigate noise outbreak.
- Excavators, dumpers etc will have exhaust suppressors and will be properly serviced and maintained. No equipment will be left running when not in use.
- All Site operatives will be properly trained in loading, unloading, excavation and handling techniques to prevent improper use of equipment which can generate unnecessary noise.
- The construction of the building envelope will be carried out in a short programme as possible. This means that the enclosure of the building occurs early in the overall programme and any noise generating activities will be carried out internally, shielded from the external environment.
- Where possible, mortar will be supplied via an electric silo avoiding the use of diesel-powered mixers.
- If the Site Manager has concerns over the levels of vibration, they can request an acoustic engineer to carry out a monitoring exercise.
- Where possible, building elements or components will be assembled off Site in factory conditions which will reduce noisy activities on Site.
- The Contractor will ensure the Site has meters supplied to monitor noise levels.

Air Quality Assessment and Dust Mitigation:

- 7.2.7 A Dust Risk Assessment is presented at **Appendix B** which has assessed the site as Low Risk and proposes appropriate mitigation measures which will be adhered to throughout the project.
- 7.2.8 The Contractor will ensure all Non-Road Mobile Machinery (NRMM) will be registered with the GLA website to ensure the GLA's London's 'Low Emission Zone' for Non-Road Mobile Machinery standards are met. All NRMM equipment (37 kW and 560 kW) shall be registered on the NRMM register and meet the standard as stipulated by the Mayor of London.
- 7.2.9 Each plot will be registered at <http://nrmm.london>.

- 7.2.10 Works will be carried out in accordance with the mitigation measures presented in the Greater London Authority SPG Dust and Emissions Control (2014) to limit dust by employing Best Practicable Means. The Site will be managed in accordance with the DCMLP to minimise the potential effects of dust and air quality from construction works.
- 7.2.11 The storage and handling of construction materials can be a significant dust emission source. The adoption of appropriate dust control measures will greatly reduce dust emissions from these sources and ensure that any adverse effects are reduced or eliminated.
- 7.2.12 Handling and storage areas will be sited as far away as is reasonably and practically possible from public areas, actively managed and fine, dry material will be stored inside enclosed shield/coverings or within central storage areas. Any storage areas that are not enclosed will be covered / sheeted. Prolonged storage of debris on Site will be avoided. All vehicles carrying dusty or potentially dust-generating materials (including, but not limited to, demolition arisings, excavated soil, sand, aggregate, and waste materials) into or out of the Site shall be fully sheeted and the sheets fastened securely at all four corners and any intermediate fixing points before the vehicle is permitted to leave the loading area, so as to prevent any escape of dust, material or debris onto the footways and carriageways abutting the Site or along the construction vehicle route. The Traffic Marshall will visually check the sheeting of every laden vehicle leaving the Site and will not release the vehicle until satisfied that the load is fully and securely sheeted; this check will be recorded in the delivery booking diary. In addition, the Site Manager (or Traffic Marshall on their behalf) will undertake a visual inspection of the footways and carriageways abutting the Site for any dust or debris spillage at a minimum frequency of three times per working day – at the start of the working day, at midday, and at the end of the working day – and immediately after every laden vehicle departure. Any dust or debris identified will be removed promptly using brooms and cleaning materials (or by calling out a road sweeper for more substantial deposits), and the inspection results and any cleaning action will be recorded in the site log.
- 7.2.13 The list of control measures which will be installed on Site to control dust are as follows:
- Personnel shall be trained in best practice for dust control by Environmental Toolbox Talks
 - Erection of hoarding around the rear Site perimeter to ensure dust/fumes do not escape
 - Use of monarflex on scaffolding
 - The location of stockpiles of soil and other potentially dusty materials away from dust sensitive properties, taking into account prevailing wind
 - General housekeeping measures including damping down and sweeping/hovering up of dusty materials
 - No burning of any materials on Site
 - Use of dust collection bags and dust suppression fixings on equipment
 - Erection of windbreak netting around dusty material stockpiles and vehicle loading/unloading areas, exposed excavation and material handling operations
 - Controlled damping down of the Site (including exposed soil and stockpiles, at work faces, loading operations and Site access roads) to suppress dust
 - Control and containment of all rainfall runoff containing sediment from Site

- Loading of material into lorries/skips within designated bays/areas
- Removal of materials and excavated soil from Site on a timely basis and in covered/sheeted trucks
- Regular inspection of local highways and site boundaries for dust deposits
- Cleaning of local highways and Site boundaries for dust deposits.
- No idling allowed on Site
- Plant and equipment will be maintained as appropriate
- Off-site fabrication to avoid cutting materials on Site, where possible.

Smoke:

7.2.14 Smoke in the form of exhaust fumes is minimised by machinery in good, well maintained order. Excessive smoke from any machine will not be allowed on site.

7.2.15 There is to be a “No Fire Policy” on the site, therefore no smoke generated from fire will occur. A fire plan will be in place and firefighting equipment will be placed strategically around the Site. A designated Smoking Area will be provided inside the Site boundary.

Temporary Drainage Strategy and Pollution Prevention Plan

7.2.16 A Temporary Drainage Strategy and Pollution Prevention Plan (PPP) will be implemented throughout the demolition and construction phases to ensure that surface water runoff is effectively managed and that there is no adverse impact on the surrounding environment, local drainage network, or nearby receptors.

Objectives

7.2.17 The primary objectives of the Temporary Drainage Strategy and PPP are to:

- Prevent uncontrolled surface water runoff from the Site;
- Minimise the risk of pollution to surface water drains and groundwater;
- Control sediment, silt, and contaminants leaving the Site;
- Ensure compliance with relevant best practice guidance, including the Environment Agency’s Pollution Prevention Guidelines (PPGs).

Surface Water Management

7.2.18 During all phases of the works, surface water runoff will be controlled using appropriate temporary drainage measures, including:

- The use of temporary drainage channels and bunding to direct runoff away from sensitive areas;
- Installation of permeable surfaces or temporary ground protection where appropriate to reduce runoff rates;
- Implementation of silt fences, straw bales, or geotextile barriers to intercept sediment-laden runoff;

- Use of settlement tanks or silt traps where required to allow suspended solids to settle prior to discharge;
- Regular inspection and maintenance of all drainage measures to ensure continued effectiveness.

7.2.19 Surface water discharge will be controlled to ensure that it does not exceed greenfield runoff rates where practicable and does not cause localised flooding.

Pollution Prevention Measures

7.2.20 A range of pollution prevention measures will be implemented on Site, including:

- Storage of fuels, oils, and chemicals in bunded areas with a capacity of at least 110% of the stored volume;
- Location of all hazardous materials away from drainage systems and watercourses;
- Provision of drip trays beneath plant and equipment where there is a risk of leakage;
- Refuelling of plant and equipment to be undertaken in designated areas with appropriate spill containment measures;
- Prohibition of discharge of contaminated water, concrete washout, or other pollutants into surface water drains.

7.2.21 Concrete washout will be undertaken in designated contained areas and will not be allowed to enter the drainage system.

Control of Sediment and Runoff

7.2.22 To minimise sediment transport from the Site:

- Exposed soils will be minimised and stabilised as soon as practicable;
- Stockpiles will be located away from drainage paths and covered or damped down where necessary;
- Wheel cleaning and road sweeping measures will be implemented where required to prevent tracking of mud onto the public highway;
- Runoff from high-risk areas will be intercepted and treated prior to discharge.

Spill Response and Emergency Procedures

7.2.23 A Site-specific Pollution Response Plan (PRP) will be in place and will include:

- Clearly identified procedures following the “Stop–Contain–Notify” approach;
- Location of spill kits and emergency equipment across the Site;
- Staff training in spill response procedures;
- Immediate containment and clean-up of any spillages;
- Notification to the relevant authorities (including the Environment Agency) where required.

Monitoring and Maintenance

7.2.24 The Contractor will be responsible for:

- Regular inspection of all drainage and pollution prevention measures;
- Keeping records of inspections and any corrective actions taken;
- Ensuring that all measures remain effective throughout the construction period;
- Updating the strategy as necessary in response to Site conditions or regulatory requirements.

Compliance

7.2.25 All works will be undertaken in accordance with:

- Environment Agency Pollution Prevention Guidance;
- The Control of Pollution (Oil Storage) (England) Regulations 2001;
- Relevant best practice for construction site drainage and environmental protection.

External Illumination:

7.2.26 Safety lighting will be installed at the front of the Site along Dawlish Road and Scales Road to protect passers-by during the construction phase. The lighting will comply with all legal requirements and will be designed to minimise light pollution. Security lighting will be directed downwards and activated only by PIR controls to ensure illumination is limited to necessary areas while maintaining safety and reducing impact on neighbouring properties.

Odour Control:

7.2.27 Specific odours are minimised by the facilities on Site.

7.2.28 All drainage will be permanent and new.

Pest Control:

7.2.29 The contractor will ensure that all areas on Site are kept as clear and tidy as possible. Accumulations of surplus or damaged building materials can act as harbourage for pests and shall be removed and disposed of promptly and safely.

7.2.30 The contractor will take appropriate measures to limit infestations from pests such as insects, birds, and rats/mice, such as:

- Preventing access to the Site, from drainage
- Ensure housekeeping is maintained to a high standard, to prevent rubbish
- Limit the potential for food and water sources

7.2.31 Food debris also encourages pests to become established. Staff Site facilities including canteens, accommodation and sanitary provision will be maintained in a clean and hygienic manner and in accordance with relevant regulations and codes of practice. All food waste will be stored safely in suitably located, pest resistant, closable containers and removed frequently.

Asbestos:

- 7.2.32 Should any Asbestos Containing Material (ACM) or suspected ACM material be encountered during ground works then all groundbreaking activity will be suspended, and a specialist asbestos contractor will be called in. Any suspected ACM material will be sent off for laboratory testing. No further ground works will be undertaken until an asbestos risk assessment has been completed and appropriate PPE and mitigation measures are implemented. Any asbestos material removed from the Site (if encountered) will be done so by an appropriately trained contractor and sent to a licensed hazardous waste landfill facility.

General Site Safety Measures:

- 7.2.33 Personal protective Equipment (PPE) will be provided for all personnel, as a minimum the following will be available:

- Safety Head Protection.
- Safety Footwear.
- Hand Protection.
- Eye/Face Protection.
- Hi-Visibility Clothing.
- Overalls.

- 7.2.34 It is the responsibility of all personnel to wear the protective equipment provided, as defined by the risk assessments, the site Foreman will enforce this policy and ensure that the correct equipment is worn when required.

Risk Assessments:

- 7.2.35 Full risk assessments for all demolition and construction activities will be undertaken by the Principal Contractor prior to commencing any works.

7.3 UXO Survey

- 7.3.1 A Preliminary UXO Assessment has been undertaken for each plot at the site which is attached at **Appendix C**. The assessment has identified the site as high risk due to the potential presence of unexploded ordnance associated with historic wartime activity.
- 7.3.2 A Detailed UXO Risk Assessment was subsequently undertaken which is attached at **Appendix C** which identified the site as a Medium Risk. All ground-intrusive works will be carried out in accordance with the recommendations and mitigation measures contained within this assessment. The appointed contractor's recommendations will be strictly adhered to throughout the construction phase.

8 Waste Management Plan

8.1 General Waste Management

- 8.1.1 The disposal of waste generated during works will be managed to maximise the environmental and development benefits from the use of surplus material and to reduce adverse effects of disposal. In general, the principles of the waste management hierarchy (shown in **Figure 8.1** below) which favours waste minimisation, reuse and recycling over disposal to landfill will be implemented.



- 8.1.2 Opportunities will be investigated to maximise recycling of groundworks and construction materials. Soft strip materials will be segregated on Site into appropriate waste streams to maximise opportunity for re-use. Asbestos containing materials will be assessed in advance of any construction works commencing, and all asbestos removed to a licensed disposal facility. If contaminated materials are found during the groundworks they will be stored, tested and disposed of in accordance with relevant best practice guidance and legislation.
- 8.1.3 Materials stored on Site for disposal (e.g. spoil arising) will be subject to the provisions of the duty of care and may require a waste management permit. Where this is identified the permit, or any exemption will be managed. Suitable protection measures will be incorporated in the design of the waste management area to prevent pollution, and regular inspections carried out to ensure that stored waste is covered by present accidental spillage and from being blown away. When leaving Site, vehicles will be sheeted/covered to prevent any escape of materials onto public highway.
- 8.1.4 To ensure compliance with legislative requirements, only Environment Agency licensed waste hauliers, waste management contractors and landfill sites will be used. Transfer notes will be retained and will fully describe the waste in terms of type, quantity and containment in accordance with relevant regulations. Information regarding the type and quantity of material returned to the supplier and the contractor or contractors will also hold copies of all waste documentation.
- 8.1.5 Waste materials from Site accommodations and surrounding areas will be cleared on a daily basis and removed to a closed skip within the Main Compound. No build-up of combustible materials will be permitted. All waste materials to be removed from Site, by each subcontractor responsible, on a regular basis.

8.2 Waste Reduction

8.2.1 A principal aim during construction will be to reduce the amount of waste generated as a result of activities on-site. In order to accord with the waste hierarchy, waste reduction methods adopted on this project will include (but not limited to):

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme
- Implementation of a “just-in-time” material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials
- Re-use of materials wherever feasible, e.g. re-use of excavated soil for landscaping. Concrete will be taken off-site for crushing and re-use
- Pre-assembly and pre-fabrication of construction materials will be prioritised wherever practicable to minimise on-site generation of waste and packaging and reduce the number of delivery and collection vehicles to and from the Site
- Segregation of waste at source where practical
- Re-use and recycling of materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing).

Use of Waste Compactors

8.2.2 The use of waste compactors is not proposed. The use of waste compactors has been considered in accordance with the comments received from the London Borough of Haringey Transport Planning team. However, on the basis of the scale and nature of the proposed works, waste compactors are not proposed for this development for the following reasons:

- **Scale of the development.** The development comprises the construction of only two new-build residential dwellings on small corner plots, together with the demolition of existing single-storey garages at Site 1 only. The total volume of waste arisings from both demolition and construction is therefore very limited and is not of a scale that would justify the deployment of compaction plant.
- **Nature of the waste streams.** The principal waste streams arising from the works are: inert demolition arisings (concrete, brick and rubble from the existing garages), excavated soil from foundations, and packaging and off-cuts from the construction phase. Inert demolition arisings and excavated soil are unsuitable for compaction and are best managed through grab lorries or skips for direct removal to a licensed recycling facility. Compaction would offer no benefit for these streams.
- **Limited vehicle movements.** As set out at Section 6, the peak forecast is 2 HGV movements per day, with a small number of skip and grab lorry movements across the programme as a whole. The marginal reduction in vehicle movements that a compactor might achieve on this site is negligible and would be outweighed by the additional plant, power demand and space required to accommodate a compactor within the constrained plot footprints.
- **Site space constraints.** Each plot has a small footprint and limited laydown area within the hoarding line. The space available is required for materials storage, welfare

facilities, and safe pedestrian and operative circulation. A compactor cannot reasonably be accommodated without compromising these uses.

- **Alternative measures already committed.** The waste reduction and management measures already committed to in this DCMLP — including just-in-time deliveries, backloading of return journeys, segregation of waste at source, re-use of demolition materials on site where practicable, off-site recycling through licensed facilities, supplier take-back schemes for packaging, and consolidation of deliveries — will achieve the underlying objective of minimising waste vehicle movements without the need for compaction plant.
- On this basis, waste compactors are not considered necessary or proportionate for this development. The justification will be recorded in the site log and the position will be reviewed by the Site Manager if waste arisings during the works prove to be materially different from those anticipated.

8.3 Waste Documentation

- 8.3.1 The Contractor will provide proof that all Site waste has been deposited or transferred to the correct facility and by appropriately licensed contractors (i.e. an audit trail). A fully completed (Waste Transfer Note) WTN will accompany the waste upon transfer from the producer to the carrier and from the carrier to the end point. The WTN will detail the type of waste, waste volume, waste classification, contractor and the name, address and registration of disposer (facility). Records will be updated regularly ensuring that all waste leaving our Site has been correctly processed with evidence of signed waste transfer notes that will be kept on-site for inspection for a minimum of 2 years or 3 years (hazardous/special) and made available for inspection upon request.

9 Implementing, Monitoring and Updating

9.1 Liaison and Consultation Process

- 9.1.1 All key stakeholders and surrounding properties will be informed of the proposed works with details of the contractor provided as mechanisms for making an enquiry or complaint.

9.2 Implementation

- 9.2.1 The DCMLP will be implemented through the following measures:

- Issue DCMLP to all subcontractors. Subcontractor to confirm adherence to the DCMLP before starting on Site.
- Site Manager will be responsible for monitoring, recording and enforcement.

9.3 Site Monitoring

- 9.3.1 The Site Manager will:

- Remind contractors and subcontractors about designated routes to and from the Site
- Check vehicles arriving at Site to make sure they meet the developer's safety requirements
- All deliveries to Site to be properly booked in (date, time in & out, company, registration, goods/plant)
- Actual vs. estimated vehicle trips will be analysed and monitored

9.4 Breaches and Complaints

- 9.4.1 Details of the site manager and liaison officer will be provided on the hoarding outside the site. All complaints will be acknowledged, followed up and closed out, and the status will be monitored, reviewed and regularly reported to the Project Director and shared with the wider project team.
- 9.4.2 The Site Manager will be responsible for managing, making the suitable arrangements, and recording the receipt of complaints with as much relevant information as possible; in the project's Complaints and Compliments Register. Investigations into complaints shall be conducted promptly and, where necessary; technical, commercial or legal advice sought from an authorised source.
- 9.4.3 Corrective actions or action plans arising from an investigation will be delegated to any relevant parties to address and close out the complaint. Contact with the originator of the complaint will be maintained until the matter is addressed.

9.5 Safety

- 9.5.1 Safety will be covered by the following:

- Any logistics and environmental related accidents or incidents will be recorded in the main Accident and Near Misses book held on Site.

- The Site Manager will take the appropriate follow up action with individual and/ or all subcontractors.
- All records and data will be made available to LBH with full transparency.

Figures and Appendices

Figure 2.1 – Regional Context Plan

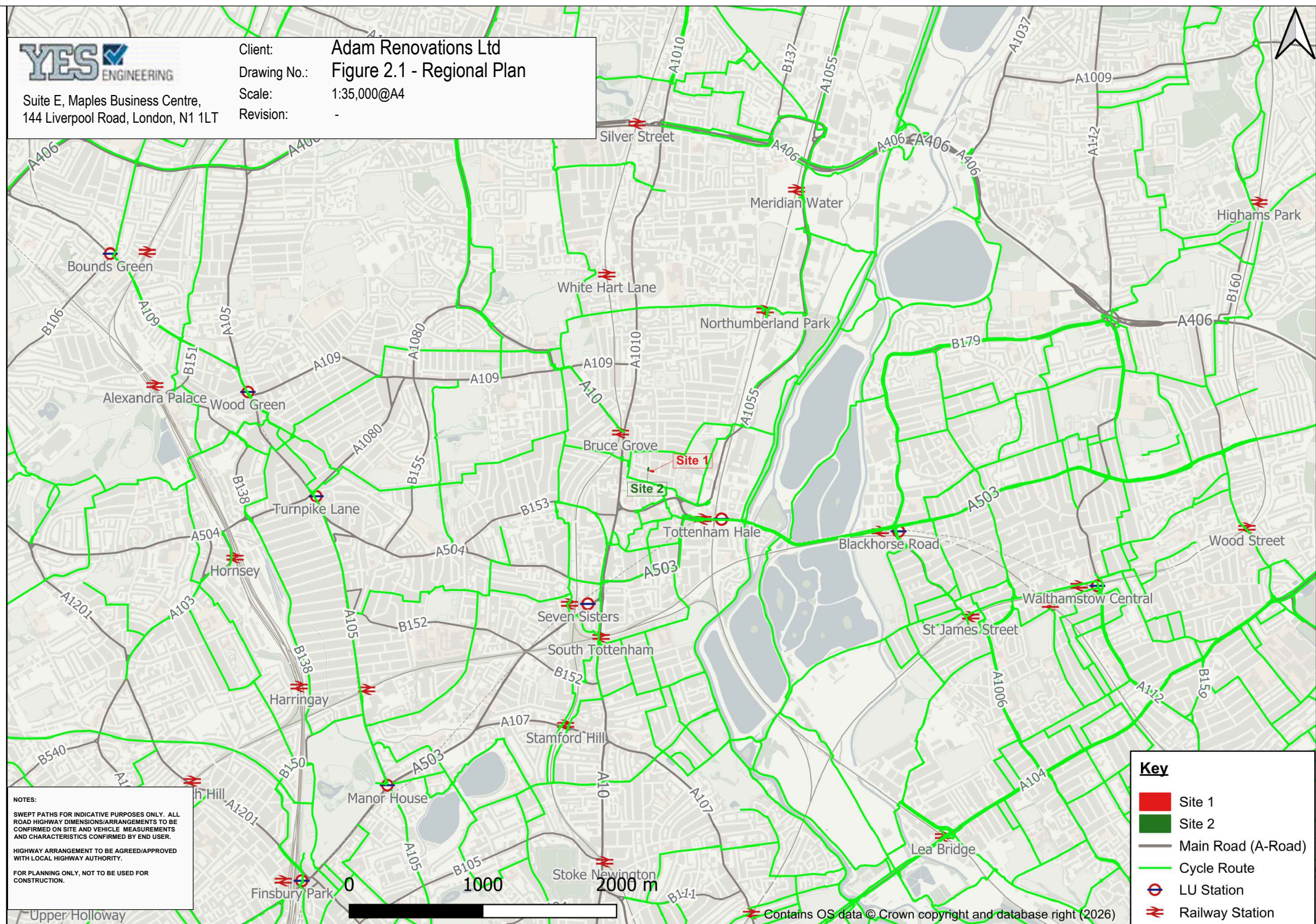
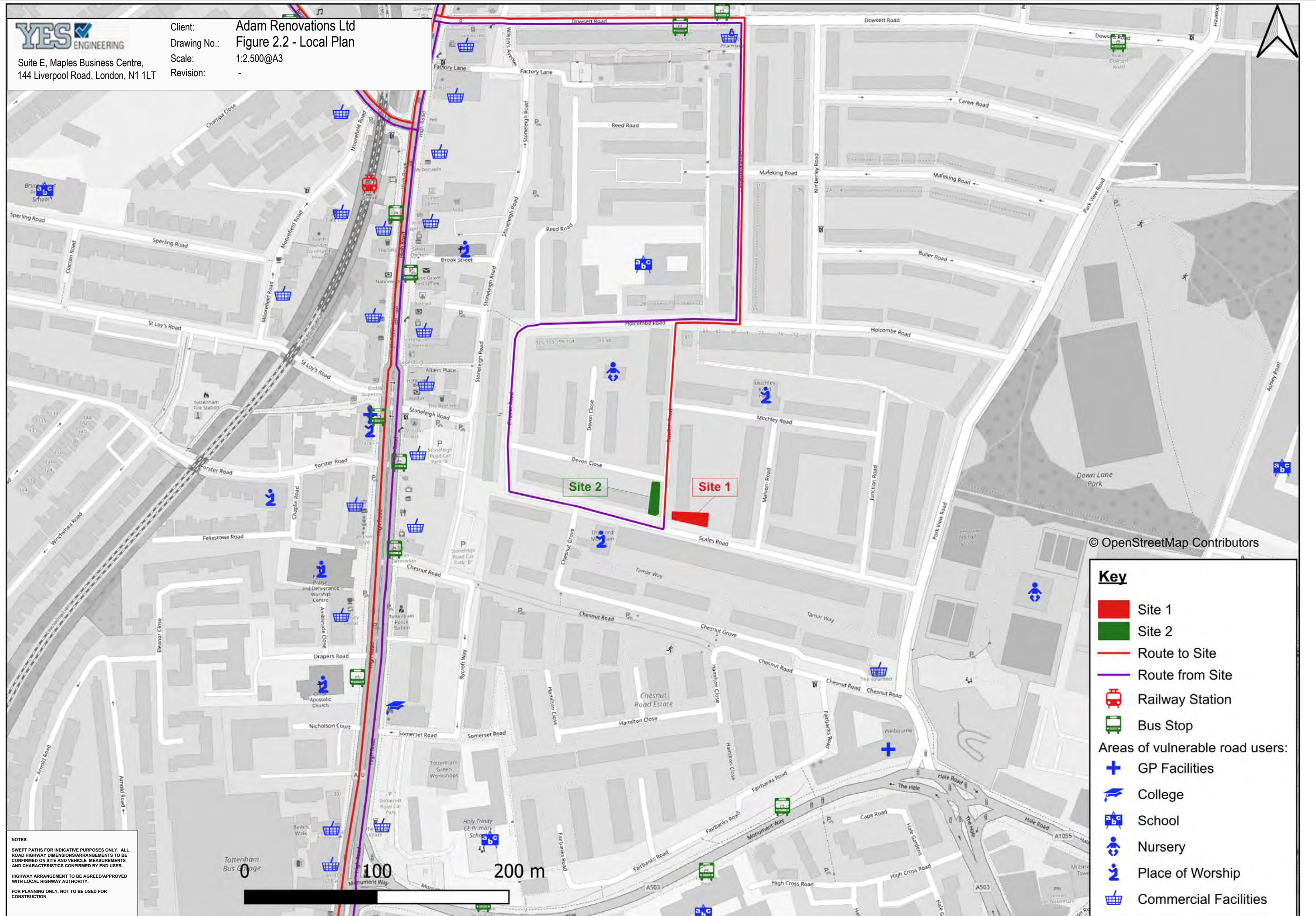


Figure 2.2 – Local Context Plan



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Key

- Site 1
- Site 2
- Route to Site
- Route from Site
- Railway Station
- Bus Stop
- Areas of vulnerable road users:
- GP Facilities
- College
- School
- Nursery
- Place of Worship
- Commercial Facilities

NOTES:
SWEEP PATHS FOR INDICATIVE PURPOSES ONLY. ALL ROAD HIGHWAY DIMENSIONS/ARRANGEMENTS TO BE CONFIRMED ON SITE AND VEHICLE MEASUREMENTS AND CHARACTERISTICS CONFIRMED BY END USER.
HIGHWAY ARRANGEMENT TO BE AGREED/APPROVED WITH LOCAL HIGHWAY AUTHORITY.
FOR PLANNING ONLY, NOT TO BE USED FOR CONSTRUCTION.

Figure 2.3 – Site Boundary Plan



Figure 4.1 – Vehicle Routeing, Regional Context

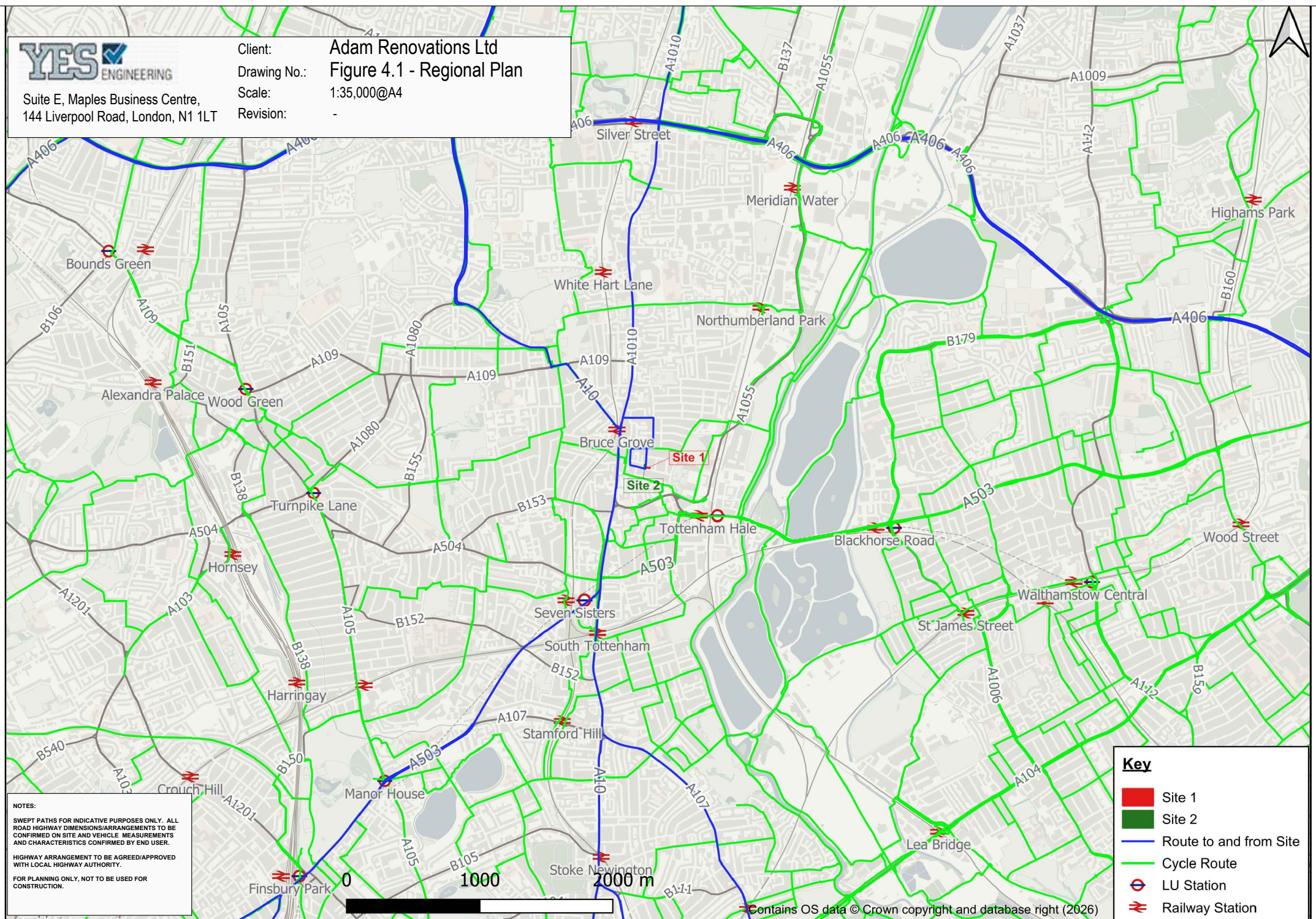
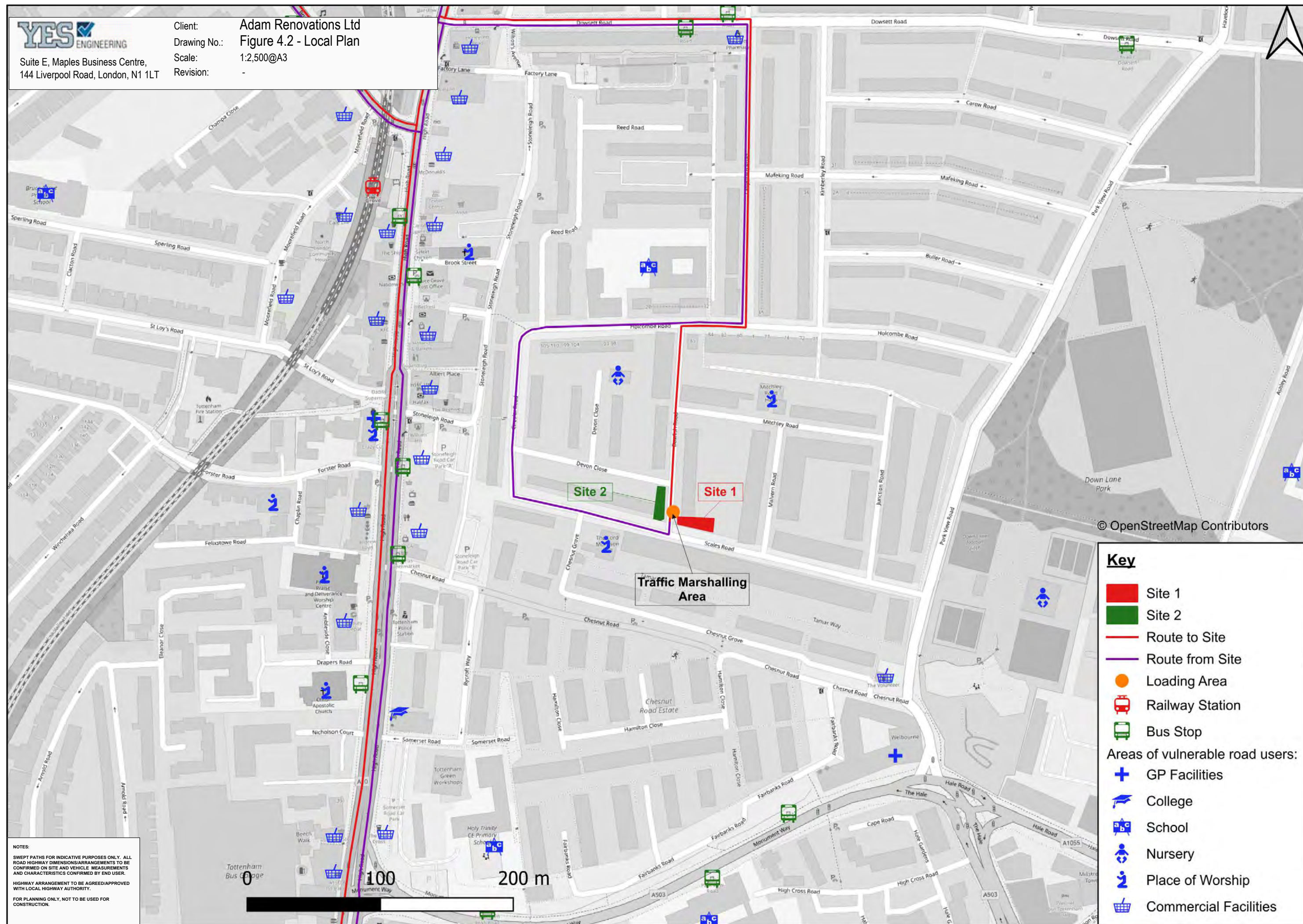


Figure 4.2 – Vehicle Routeing, Local Context



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Key

- Site 1
- Site 2
- Route to Site
- Route from Site
- Loading Area
- Railway Station
- Bus Stop
- Areas of vulnerable road users:
- GP Facilities
- College
- School
- Nursery
- Place of Worship
- Commercial Facilities

NOTES:
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HIGHWAY ARRANGEMENT TO BE AGREED/APPROVED WITH LOCAL HIGHWAY AUTHORITY.
FOR PLANNING ONLY, NOT TO BE USED FOR CONSTRUCTION.

Figure 4.3 – Site Access and Loading/ Unloading Areas/Swept Paths

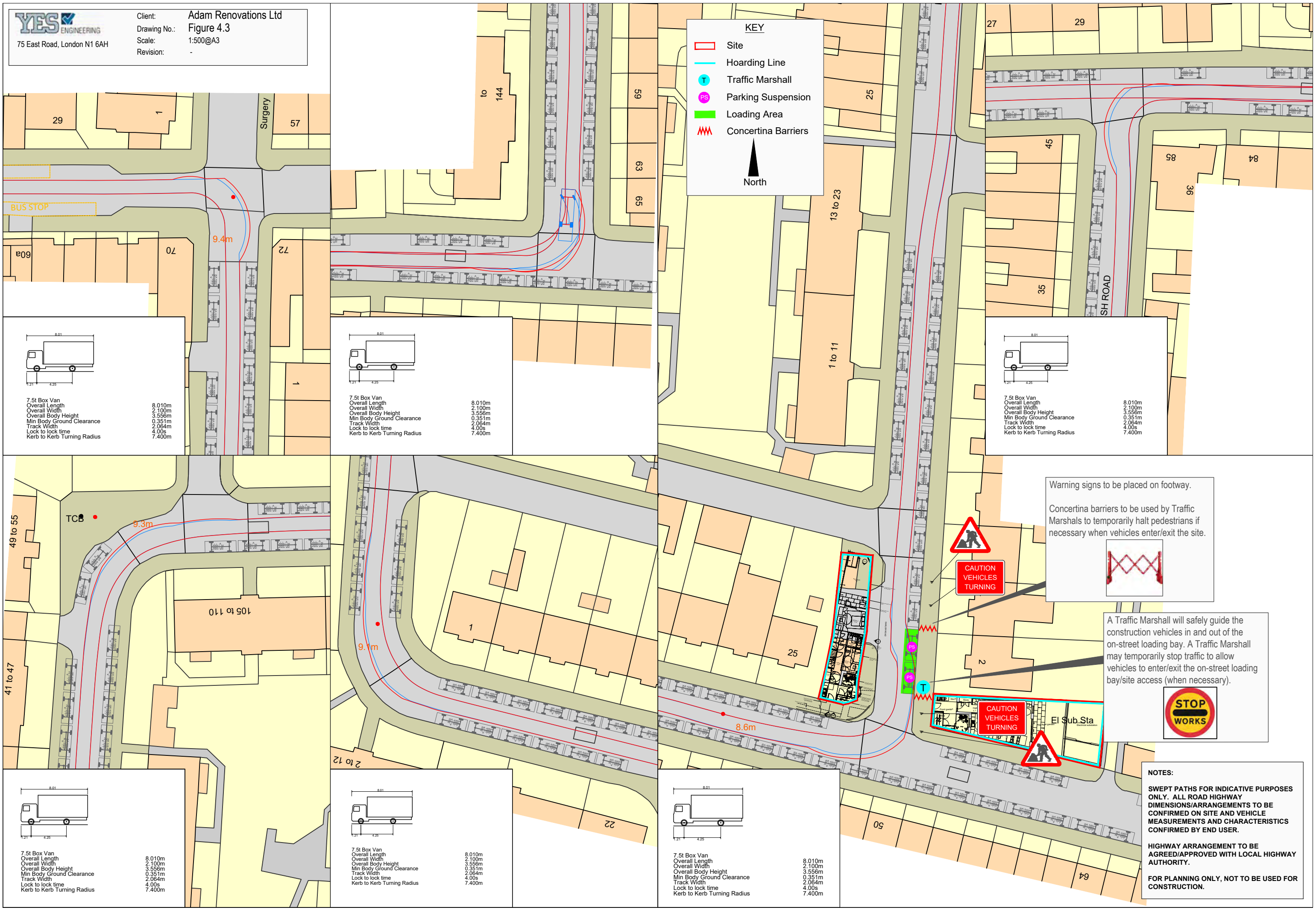


Figure 4.4 – Swept Paths of Fire Tender Passing Loading Bay While Occupied

KEY

-  Site
-  Hoarding Line
-  Traffic Marshall
-  Parking Suspension
-  Loading Area
-  Concertina Barriers



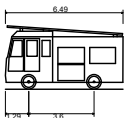
25

3.76

CAUTION
VEHICLES
TURNING

CAUTION
VEHICLES
TURNING

8.6m



Dennis Rapier Fire Tender
Overall Length 6.490m
Overall Width 2.300m
Overall Body Height 2.300m
Min Body Ground Clearance 0.383m
Track Width 2.300m
Lock to lock time 5.00s
Kerb to Kerb Turning Radius 6.095m

6.490m
2.300m
2.300m
0.383m
2.300m
5.00s
6.095m

NOTES:
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Appendix A – Approved Site Layout Plan

- ### Note

P1		ISSUED FOR PLANNING	27/07/22
Rev Issued by		Revision Description	Date
REVISION SCHEDULE			

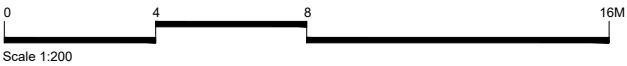


75 Nutley Lane
Reigate
RH2 9HA

01737 448011
hello@campbellandcoarchitects.com
www.campbellandcoarchitects.com

Project	Dawlish Road London
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Job	Drawing No.	Rev.	
1951	(01)002	P1	
Drawn by	Checked by	Scale at A3	Date created
EH	JC	1:200	08/21



Appendix B – Dust Risk Assessment

Appendix B – Dust Risk Assessment

This Dust Risk Assessment (DRA) has been prepared in accordance with Planning Condition 10(d)(v) attached to planning permission HGY/2022/2000 for the corner of Dawlish Road and Scales Road, London, N17 9HN, and in response to the comments received from the London Borough of Haringey on 29 April 2026 in connection with the discharge of conditions application HGY/2026/1170.

The assessment has been prepared in accordance with the methodology set out in the Greater London Authority (GLA) Supplementary Planning Guidance: The Control of Dust and Emissions During Construction and Demolition (July 2014) (“the GLA SPG”), which itself adopts the methodology set out in the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (Version 2.2, 2024).

Assessment Methodology

The GLA SPG / IAQM methodology assesses the risk of dust effects from four separate site activities:

- Demolition – the pulling down of buildings or structures.
- Earthworks – the excavation and movement of soils (e.g. for foundations or landscaping).
- Construction – the building of new structures.
- Trackout – the transport of dust and dirt from the site onto the public road network where it may be deposited and re-suspended by vehicles.

For each activity, the risk of dust impact is determined by combining:

- The dust emission magnitude of the activity (Small / Medium / Large), based on the scale, duration and nature of the works; and
- The sensitivity of the surrounding area, based on the proximity, number and nature of human and ecological receptors, and existing background air quality.

The combination of these two factors produces a risk category for each activity (Negligible, Low, Medium or High), which in turn determines the level of site-specific mitigation required. The overall risk for the site is taken as the highest risk identified across the four activities.

Step 1 – Screening the Need for a Detailed Assessment

In accordance with the GLA SPG / IAQM guidance, a detailed assessment is required where there is:

- A ‘human receptor’ within 350 m of the site boundary and / or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s); or
- An ‘ecological receptor’ within 50 m of the site boundary and / or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Residential properties are present immediately adjacent to and opposite both plots along Dawlish Road and Scales Road, and along the agreed construction vehicle route. The screening criteria are therefore triggered and a full risk assessment has been undertaken below.

There are no statutorily designated ecological sites (SSSI, SAC, SPA, Ramsar, NNR or LNR) within 50 m of the site boundary or within 50 m of the construction vehicle routes. An ecological assessment is therefore not required.

Step 2 – Assessment of the Risk of Dust Impacts

Step 2A – Dust Emission Magnitude

The dust emission magnitude for each of the four activities has been assessed against the indicative criteria set out in the IAQM guidance and is summarised in Table B.1 below.

Table B.1 – Dust Emission Magnitude

Activity	Magnitude	Justification	Reference
Demolition	Small	Demolition is limited to the existing single-storey garages at Site 1, with a total demolition volume well below 20,000 m ³ . Demolition will be undertaken using handheld power tools (no mechanical breaker or mobile crusher will be used on site). Demolition material will be stockpiled within the site footprint and removed via grab lorries or skips. Working height is below 10 m. The works are not dust-generating in nature beyond the immediate works area.	IAQM Table 1
Earthworks	Small	Earthworks are limited to the excavation of strip foundations for two new-build residential dwellings. Total site area for both plots is well below 2,500 m ² and the volume of excavated material is small. Excavation will be by mini-excavator. There will be no bulk earthworks, sand-and-gravel handling or potentially dusty soils. Foundations will be poured promptly, limiting the time exposed material is left open.	IAQM Table 2
Construction	Small	Construction comprises two small-scale new-build residential dwellings of traditional brick / block construction with internal timber stud walls. Total construction volume of both plots combined is well below 25,000 m ³ . No on-site concrete batching or bagged cement handling at scale is proposed; mortar will, where possible, be supplied via electric silo. There will be no use of mobile crushers, screeners or sandblasting equipment on site.	IAQM Table 3
Trackout	Small	The peak number of HGV movements is forecast to be 2 vehicles per day, with fewer than 10 outward HGV movements in any one day across the entire programme (see DCMLP Section 6). All HGV movements are restricted to vehicles ≤ 8 m in length. Vehicles will not enter the site; loading and unloading will take place from a designated kerbside loading bay on Dawlish Road. The unpaved surface over which vehicles travel on site is effectively zero. The length of the road affected (the residential streets between the site and the A1010) is less than 50 m of unpaved surface and is fully surfaced public highway.	IAQM Table 4

Step 2B – Sensitivity of the Surrounding Area

The sensitivity of the area is determined by combining the sensitivity of receptors (high, medium or low), the number of receptors, the distance of receptors from the site, and (for human health and PM₁₀) the existing background concentration of PM₁₀. The overall area

sensitivity is reported separately for the three potential effects: dust soiling, human health and ecological.

Dust Soiling

Residential properties (high-sensitivity receptors) are present immediately adjacent to both plots, with terraced housing fronting directly onto Dawlish Road and Scales Road on both sides of the carriageway. There are estimated to be more than 10 but fewer than 100 high-sensitivity receptors within 20 m of the site boundary, and the works will take place within 20 m of these properties. In accordance with IAQM Table 5, this gives an area sensitivity to dust soiling of Medium.

Human Health

The site is located within the London Borough of Haringey, which has been declared an Air Quality Management Area (AQMA) for the whole borough in respect of exceedances of the annual mean nitrogen dioxide (NO₂) and PM₁₀ objectives. However, modelled and monitored annual mean PM₁₀ concentrations in the immediate vicinity of the site (based on Defra background mapping for the relevant 1 km grid square and the GLA London Atmospheric Emissions Inventory) are below the annual mean objective of 40 µg/m³ and are typically in the range 18–24 µg/m³.

There are estimated to be more than 10 but fewer than 100 high-sensitivity receptors (residential properties) within 20 m of the site boundary. Applying IAQM Table 6 with annual mean PM₁₀ concentrations of < 24 µg/m³, the area sensitivity to human health impacts is Low.

Ecological

There are no statutorily designated ecological sites within 50 m of the site boundary or within 50 m of the construction vehicle routes. The area sensitivity to ecological impacts is therefore Low and no further ecological assessment is required.

Step 2C – Risk of Dust Impacts (before mitigation)

Combining the dust emission magnitudes determined at Step 2A with the area sensitivities determined at Step 2B in accordance with IAQM Tables 7–10 produces the risk categories set out in Table B.2 below.

Table B.2 – Summary of Dust Risk (before mitigation)

Activity	Dust Soiling	Human Health	Ecological	Overall
Demolition	Low	Negligible	Negligible	Low
Earthworks	Low	Negligible	Negligible	Low
Construction	Low	Negligible	Negligible	Low
Trackout	Low	Negligible	Negligible	Low
Site Risk	Low	Negligible	Negligible	Low

The site is therefore categorised overall as a Low Risk site in accordance with the GLA SPG / IAQM methodology. This is consistent with the classification of the development as a Medium Impact Site in the planned-measure checklist at Table 5.1 of this DCMLP, given that the impact classification considers a wider range of construction effects than dust alone.

Step 3 – Site-Specific Mitigation

The mitigation measures appropriate to a Low Risk site, set out in IAQM Table 13 and the GLA SPG, will be implemented for the duration of the demolition and construction works.

These measures supplement, and are to be read alongside, the air quality and dust mitigation measures already set out in Section 7.2 of this DCMLP.

Communications

- Develop and implement a Stakeholder Communications Plan that includes community engagement before the works begin on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary hoarding. This may be the Site Manager or another suitable representative.
- Display the head or regional office contact information.
- Record all dust and air quality complaints, identify the cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority on request.
- Record any exceptional incidents that cause dust and / or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Site Management

- Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is essential to liaise with neighbouring developers as cumulative impacts may be greater than for a single site (no such sites have been identified at the time of writing – see DCMLP Section 4.2).

Monitoring

- Carry out daily on-site and off-site visual inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site (a 2.4 m minimum-height hoarding will be erected at the front of each plot, as set out in Section 3.3 of the DCMLP).
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover them as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures, provided the risk assessment has identified that it is safe to do so).
- Produce a Construction Logistics Plan (the present DCMLP) to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials (a “No Fire Policy” is already adopted on the site – see Section 7.2 of the DCMLP).

Measures specific to demolition

- Soft strip inside buildings before demolition (retaining walls and roof where possible to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand-held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives – confirmed not required for this development.
- Bag and remove any biological debris or damp down such material before demolition.

Measures specific to earthworks

- Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures specific to construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures specific to trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned (note: as set out in DCMLP Section 4, vehicles will not enter the site – a hard surfaced public highway is used throughout).
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). As vehicles will not enter the site boundary, a wheel-wash facility is not proposed; staff equipped with brooms and cleaning materials will be on hand and road sweepers will be deployed if required (see DCMLP Section 7.2).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Non-Road Mobile Machinery (NRMM)

In accordance with the GLA SPG and Mayoral policy, all NRMM with a net power between 37 kW and 560 kW operating on the site will:

- Meet the relevant emission standards for the Central Activities Zone and Canary Wharf Low Emission Zone for NRMM (or such standards as are in force at the time of works);
- Be registered on the GLA NRMM register (<https://nrmm.london/>) prior to works commencing, with each plot registered separately;
- Have proof of registration available on site at all times for inspection by the Local Authority;
- Be regularly serviced, with service logs kept on site, including proof of emission limits, available for inspection.

An inventory of NRMM on site will be maintained by the Contractor and updated whenever plant arrives at or leaves the site.

Step 4 – Determining Significant Effects

In accordance with paragraph 8.4 of the IAQM guidance, with the mitigation measures set out at Step 3 above and elsewhere in this DCMLP fully implemented, the residual effect of dust emissions from demolition and construction activities at the site is assessed as not significant.

This conclusion reflects:

- The small scale of the proposed works (two new-build residential dwellings and demolition of existing single-storey garages only);
- The Small dust emission magnitude across all four activities (demolition, earthworks, construction and trackout);
- The very low forecast vehicle movements (peak of 2 HGV movements per day);
- The implementation of the full suite of mitigation measures set out at Step 3 above;
- Compliance with the Mayor's NRMM standards through registration at <https://nrmm.london/>;
- The presence of a Community Liaison Officer and a documented complaints procedure (DCMLP Section 9).

Monitoring and Review

The Site Manager will be responsible for the implementation of this Dust Risk Assessment and the associated mitigation measures, and for ensuring that all site personnel and sub-contractors are made aware of, and comply with, its requirements. This responsibility will include:

- Daily on-site and off-site visual inspections during dust-generating activities and prolonged dry or windy conditions, with results recorded in a site log;
- Maintenance of the NRMM inventory and associated service logs;
- Maintenance of the dust and air quality complaints log, made available to the London Borough of Haringey on request;
- Periodic review of this Dust Risk Assessment, particularly if the scope of works, programme or methodology changes materially during construction.

Where complaints are received, or where monitoring identifies that mitigation measures are not adequately controlling dust emissions, the Site Manager will investigate the cause, implement additional control measures, and record the action taken in the site log. The London Borough of Haringey will be informed of any significant incidents and the corrective action taken.

Appendix C – UXO Assessment



Preliminary Unexploded Ordnance Risk Assessment

Dawlish Road, London

10670 PRA



Unit 3, The Courtyard Campus Way, Gillingham Business Park, Gillingham, Kent, ME8 0NZ

Preliminary UXO Risk Assessment	
Client	YES Engineering
Report Reference	10670
Date	11/03/2026
Preliminary UXO Rating	
HIGH	
Recommendation	
A Stage 2 Detailed UXO Risk Assessment of the site should be undertaken to clarify the UXO risk to the proposed works.	
Information	
This Report has been produced in compliance with the Construction Industry Research and Information Association guidelines for the preparation of Preliminary Unexploded Ordnance Risk Assessments in the management of UXO risks in the construction industry. This report has been compiled using all due diligence and expertise and having made all proper but reasonable enquiries within given time limitations. However, in accepting and implementing the recommendations contained in this report, the client does so strictly at his own risk.	
Igne UXO Limited Registered Office: Overcross House, Ross Park, Ross-on-Wye, Herefordshire, HR9 7US, United Kingdom Trading Office: Unit 3, The Courtyard, Campus Way, Gillingham Business Park, Gillingham, Kent, ME8 0NZ Tel: 0371 789 1000 Email: hello@igne.com www.igne.com Registered in England No. 14747649 VAT Registration No. GB 171 628 112	

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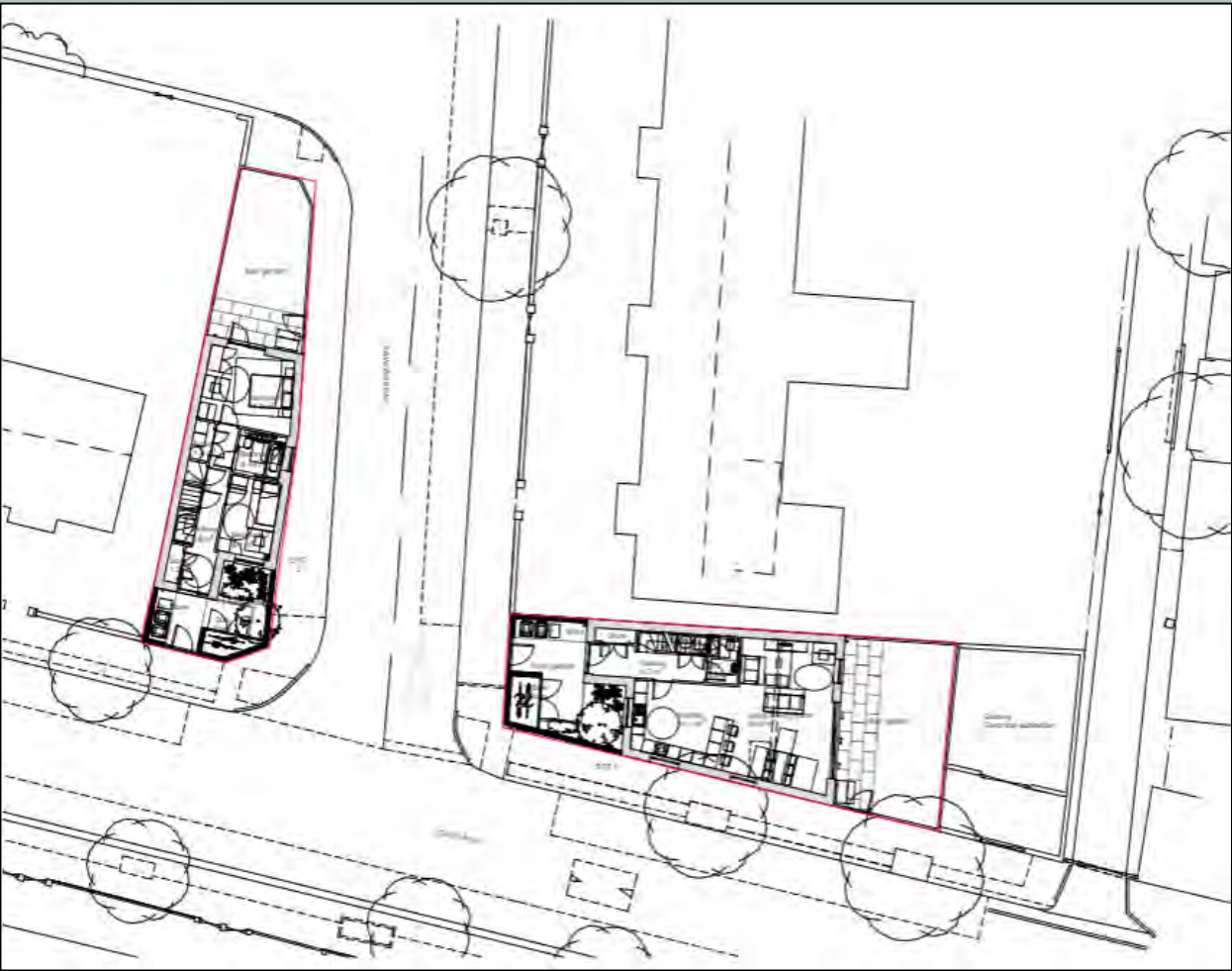
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Figure 1 Local German Bombing Density Map

Figure 2 UXO Point of Interest Map

Glossary of Terms

AAA	Anti-Aircraft Artillery
ARP	Air-raid Precautions
EOD	Explosive Ordnance Disposal (current term for “bomb” disposal)
HAA	Heavy Anti-Aircraft
HE	High Explosive
HG	Home Guard
IB	Incendiary Bomb
LAA	Light Anti-Aircraft
LSA	Land Service Ammunition (includes grenades, mortars, etc.)
Luftwaffe	German Air Force
NGR	National Grid Reference
RAF	Royal Air Force
SAA	Small Arms Ammunition (small calibre cartridges used in rifles & machine guns)
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	“Doodlebug” the first cruise type missile, used against London from June 1944. Also known as ‘Flying Bomb’
V-2	The first ballistic missile, used against London from September 1944
WWII	Second World War (1939 – 1945)

Project Name	Dawlish Road, London
	
Site Address	Dawlish Road, Tottenham Hale, London Borough of Haringey, Greater London, N17 9HN
Centre Point NGR	TQ 34011 89840

1. Introduction

The purpose of the *Stage 1 Preliminary Risk Assessment* is a qualitative screening exercise to assess the potential of finding unexploded ordnance (UXO) at a site. The process requires the consideration of the basic factors that affect the potential for UXO to be present at a site and the likelihood for any hazard to occur.

The aim of the preliminary assessment is to identify or discount the need for further detailed research (in the form of a *Stage 2 Detailed Risk Assessment*) to be conducted, to further clarify the risk from UXO.

The Preliminary Risk Assessment uses the sources of information available to Igne in-house, to place a development in context with domestic military and conflict history.

This assessment has been produced in accordance with the CIRIA C681 Guidelines: *Unexploded Ordnance, a Guide for the Construction Industry, 2009*.

The report will assess the following:

- Extent of Proposed Intrusive Works
- Conflict History / Enemy Actions
- Domestic Aerial, Naval and Land-Based Military Activity
- Consideration of any Risk Mitigating Factors

The assessment is intended as a common sense 'first step' in the UXO risk management process.

2. Site Information

This section will give a brief overview of current site conditions and any details of proposed works on the project.

Site Description

The study area is comprised of two sites, one has hardstanding and one is a pocket of open ground. These sites are separated by Dawlish Road running from north to south. Scale Road runs adjacent to the sites southern boundary.

Scope of Proposed Works

Proposed works include the construction of a single two-bedroom dwelling on each site plot. It is anticipated that the only intrusive groundworks will consist of standard strip foundations and shallow trenches for drainage / utility purposes.

3. Historical Site Conditions

This section will examine conditions on site during WWII, and the potential for UXO to have been concealed or unrecorded.

Ground Conditions During WWII

Pre-war OS mapping indicates that both sites were occupied by residential dwellings and their associated gardens. As such, in any areas of open ground, UXB strikes could have conceivably gone unnoticed.

However, as outlined in Section 4, there are clear indications of substantial bomb-related clearance on both sites and within the surrounding area. Therefore, unconsolidated material, such as rubble, would have likely been prevalent within the study area, presenting the added potential for UXBs to land and go unnoticed during subsequent raids.

Degree of Access During WWII

Access to the dwellings on the sites were likely frequent. However, access to the gardens during nighttime hours was likely to have been more limited. Note that a substantial number of Tottenham air raids occurred at night.

Nevertheless, as outlined in Section 4, evidence of significant bomb damage on site suggests that the site would have been abandoned for considerable period of time.

4. Aerial Bombing & Air-Delivered UXO

This section will summarise bombing records for the project site location available during a preliminary search. Home Office, ARP and secondary sources will be sought and reviewed.

Enemy Bombing During WWII

- The site was located in an area that sustained a High bombing density during WWII.
- Wartime incident reports produced by the Home Office record at least 50No. Individual raids over Tottenham.
- Luftwaffe target documents show that the Tottenham water treatment works, along with its associated infrastructure (<1km east of the site) were demarcated for targeting.
- A review of Tottenham Borough Bomb Census maps indicate multiple bomb strikes on / in close proximity to the study area.

- RAF aerial photography from 1947 indicates substantial clearance along Dawlish Road, including **on one of the sites**.¹ Wartime OS mapping suggests that **both sites** were eventually cleared.²

A section of Igne's German Bombing Density Map is presented in Figure 1. This map, compiled from the available records and statistics, shows an estimated level of bombing over the site location.

5. Military Activity & Allied UXO

This section will summarise records of military activity around the project site location available during a preliminary search. Archive and secondary information will be sought and reviewed.

Historic Military Installations (distances approximate)

- No defensive fortifications were recorded within the project site or the surrounding area.
- A Pillbox was the nearest recorded defensive position to the site (approx. 850m south-east).
- At least 4No. HAA batteries were recorded within effective range of the site, likely supported by additional mobile AA guns protecting nearby targets.
- Given the proximity of plotted strikes, as well as widespread clearance on site, AA fire was likely expended in the direction of the site on a frequent basis.

A section of Igne's UXO Points of Interest Map is presented in Figure 2. This map, compiled from a range of historical records and modern data, shows the locations of military features close to the site. Note, this map is periodically updated as Igne acquires additional information and therefore is not a comprehensive map of all military activity.

¹ https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/raf_cpe_uk_2141_v_5373

² <https://maps.nls.uk/view/189259661>

6. Post-WWII Local UXO Encounters

This section will detail any records of UXO discoveries or encounters on site or in close proximity, found during a preliminary search.

Items Found Nearby

No recent UXO discoveries or encounters in the local area could be found during a preliminary search.

7. Post-WWII Risk Mitigating Factors

This section will detail post-WWII activity on site that may have contributed to mitigation of remaining UXO. Ground works on site will be taken into account, as well as any military-led or commercial clearance operations.

Post-WWII Redevelopment & Clearance Works

A review of post-war OS mapping indicates that the sites were only subjected to shallow intrusive works following land clearance.

8. Conclusions

This summary will take into account the preliminary findings of this report to determine the likelihood that the site could have been contaminated and if the UXO could still remain.

Summary of Preliminary Findings

The site was located in an area of high bombing density, with a significant number of air raids recorded over Tottenham. There are several indicators to suggest the site suffered significant damage during the war. Chiefly, Tottenham ARP bomb census maps show bombing on / adjacent to the study area. This is corroborated by wartime aerial photography and OS mapping, which show significant clearance on both sites and in the immediate area.

Moreover, multiple HAA batteries were identified within effective firing range of the site. It is likely that these emplacements would have been firing frequently throughout the war. Given that the site would have been occupied by rubble/debris for a considerable period of time, it is possible that the impact of a UXB or unexploded anti-aircraft shell could have gone undetected.

As such, further research is required to ascertain the threat posed to the site by both German Air-Delivered and Allied UXO.

9. Preliminary Risk Rating

The preliminary UXO risk rating for the site has been assessed as:

HIGH

10. Recommendations

Igne recommends the following:

Recommendation
A Stage 2 Detailed UXO Risk Assessment of the site should be undertaken to clarify the UXO risk to the proposed works.

For more information or a no-obligation quotation for these recommendations, please feel free to get in touch with Igne at hello@igne.com or 0371 789 1000.

Figures

Information

- These maps are regularly updated as new information becomes available.
- Bombing density data is derived from multiple WWII records and has been localised while maintaining accuracy. Since bombing density varies across large towns and cities, an average has been applied, meaning some areas may have higher levels than indicated.
- Where no bombing data exists, additional research has been conducted as part of the Preliminary Risk Assessment.
- Figure 2 is not a definitive record of all military sites, as no complete dataset exists from the MoD or War Office. It is an evolving resource, supplemented by further research during the Preliminary Risk Assessment.
- The presented locations of features in Figure 2 are approximate and are based on information excerpted from their original source material.
- Igne is not liable for any gaps or missing historical data due to incomplete wartime records.

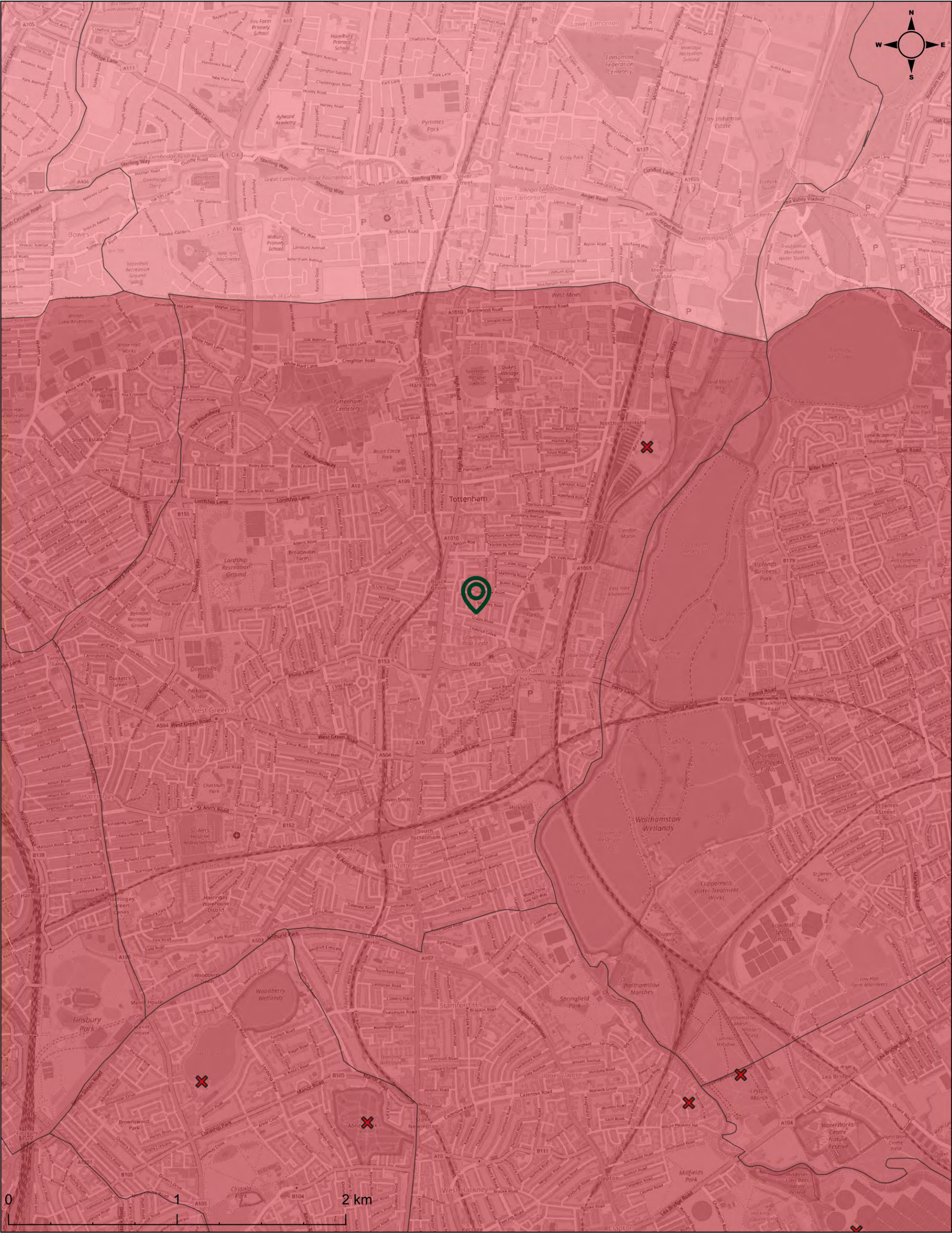


Figure 1.0 WWII Air Delivered HE Bombing Density	Key Site location Negligible Low Low-Moderate Moderate Moderate-High	High Very High Abandoned bombs Decoy sites			
			Document Reference: 10670		

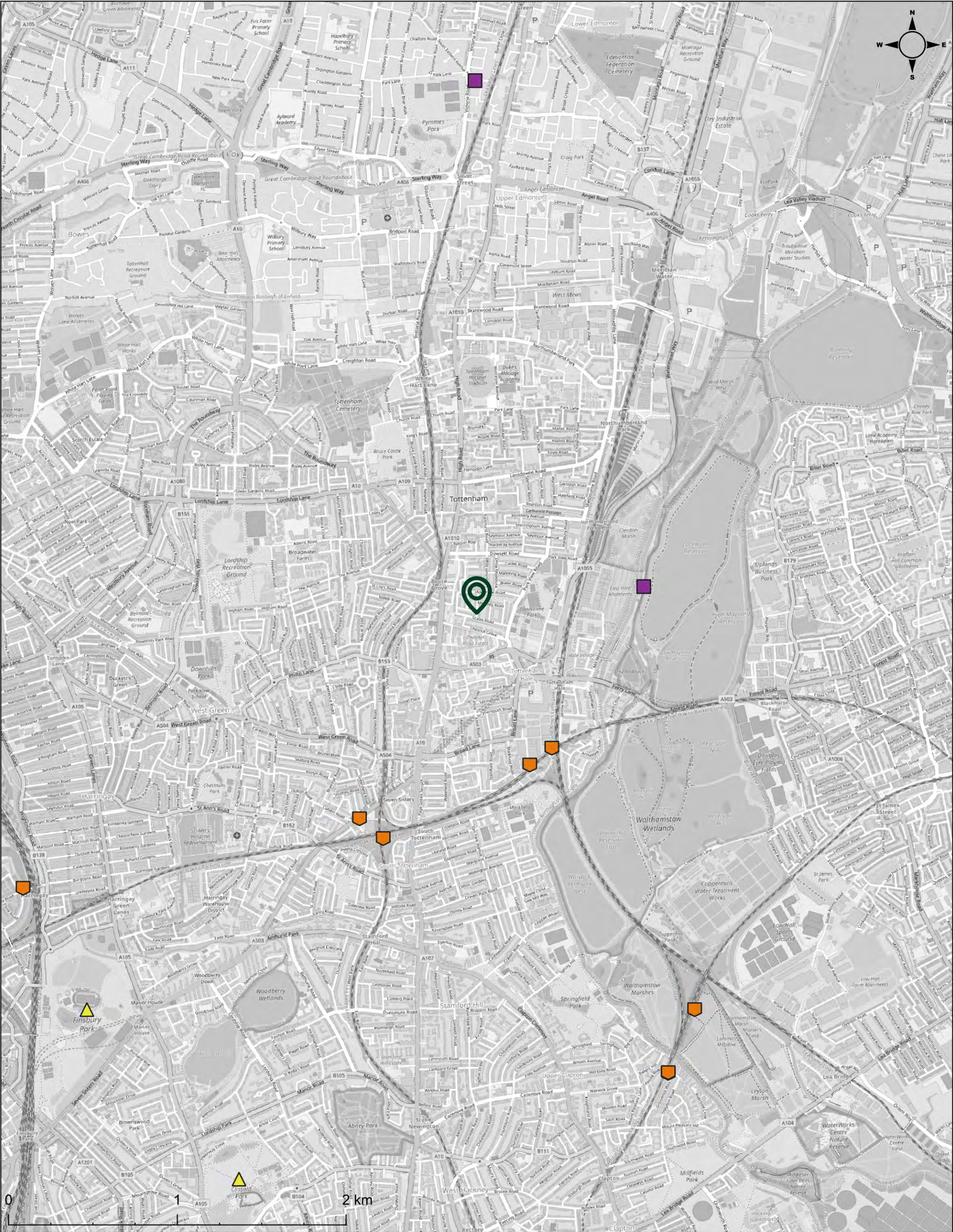


Figure 2.0

Potential Sources of Allied
UXO Contamination

Key					
Site Location					
Airfield					
Artillery					
Coastal Defences					
Defensive Position					
Explosives Facility					
Military Site					
Training Facility					
Training Area(s)					



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Detailed Unexploded Ordnance Risk Assessment

Dawlish Road, London

10692 RA



Unit 3, The Courtyard Campus Way, Gillingham Business Park, Gillingham, Kent, ME8 0NZ

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This Report has been produced in compliance with the Construction Industry Research and Information Association guidelines for the preparation of Detailed Unexploded Ordnance Risk Assessments in the management of UXO risks in the construction industry. This report has been compiled using all due diligence and expertise and having made all proper but reasonable enquiries within given time limitations. However, in accepting and implementing the recommendations contained in this report, the client does so strictly at his own risk.

Distribution

Version	Format	Recipient	Author	Review	Authorisation	Date
1.0	PDF Copy	Adam Group Ltd	KN	OA	NB	02/04/2026

Igne UXO Limited

Registered Office: Overcross House, Ross Park, Ross on Wye, Herefordshire, HR9 7US, United Kingdom

Trading Office: Unit 3, The Courtyard, Campus Way, Gillingham Business Park, Gillingham, Kent, ME8 0NZ

Tel: 0371 789 1000

Email: hello@igne.com

www.igne.com

Registered in England No. 14747649

VAT Registration No. GB 171 628 112

Report Summary

Project Site Information					
Project site address	Dawlish Road, Tottenham Hale, London Borough of Haringey, Greater London, N17 9HN				
NGR Centre Point	TQ 34011 89840				
Scope of proposed works	Proposed works include the construction of a single two-bedroom dwelling on each site plot. It is anticipated that the only intrusive groundworks will consist of standard strip foundations and shallow trenches for drainage / utility purposes. However, the client has also advised that deeper boreholes may also be required following recommendations from previous site investigations.				
Overall Risk Rating	MEDIUM				
Summary of Risk Ratings					
Hazard	Average Depth of Hazard	pE	cD	Risk Analysis (pE x cD)	Risk Rating
HE	<12m bgl ¹	3	5	15	Medium
IB	<1m bgl	2	4	8	Medium
AA	<5m bgl	3	4	12	Medium
LSA	<2m bgl	1	4	4	Low
SAA	<1m bgl	1	2	2	Low
Recommended Mitigation Measures					
Proposed Works	Risk Mitigation Recommendation				
All	- Site Specific Explosive Ordnance Safety and Awareness Briefings (UXO Toolbox Briefing) to all personnel conducting intrusive works - Site Specific Safety Instructions (SSSI) Training Course				
Shallow intrusive works	Explosive Ordnance Disposal (EOD) Engineer On-Site Support (Watching Brief)				
Boreholes	Support to Borehole Drilling				
Piling	Intrusive Magnetometer Survey of all pile locations down to the maximum bomb penetration depth				

In accordance with CIRIA guidelines this assessment has carried out research, analysed the evidence and considered the likelihood that the site has been contaminated with unexploded ordnance; that such items remained on site; the risk that they could be encountered during any intrusive works and the consequences that could result. Appropriate risk mitigation measures have been proposed.

¹ See Section 7.6. A site-specific maximum bomb penetration depth is assumed between 10-12m below WWII ground level.

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Appendix 1	Generic Types of German Air-Delivered Ordnance
Appendix 2	Generic Types of British / Allied Ordnance

Glossary of Terms

AAA	Anti-Aircraft Artillery
ALARP	As Low As Reasonably Practicable
AP	Anti-Personnel
ARP	Air-raid Precautions
BDO	Bomb Disposal Officer
BPD	Bomb Penetration Depth
EOD	Explosive Ordnance Disposal (current term for “bomb” disposal)
HAA	Heavy Anti-Aircraft
HE	High Explosive
HG	Home Guard
IB	Incendiary Bomb
LAA	Light Anti-Aircraft
LCC	London County Council
LM	Land Mine
LSA	Land Service Ammunition (includes grenades, mortars, etc.)
Luftwaffe	German Air Force
m bgl	Metres Below Ground Level
MoD	Ministry of Defence
NGR	National Grid Reference
OB	Oil Bomb
PM	Parachute Mine
RAF	Royal Air Force
SI	Site Investigation
SAA	Small Arms Ammunition (small calibre cartridges used in rifles & machine guns)
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	“Doodlebug” the first cruise type missile, used against London from June 1944. Also known as ‘Flying Bomb’
V-2	The first ballistic missile, used against London from September 1944
WWI	First World War (1914 -1918)
WWII	Second World War (1939 – 1945)

Detailed Unexploded Ordnance Risk Assessment

In respect of

Dawlish Road, London

1. Introduction

YES Engineering, on behalf of Adam Group Ltd (“the client”), has commissioned Igne to conduct a Detailed Unexploded Ordnance Risk Assessment of Dawlish Road, London (“the site”).

Unexploded Ordnance (UXO) poses significant risks to UK construction projects due to past conflicts and military activity. Buried unexploded air-dropped bombs and anti-aircraft projectiles, with an estimated failure rate of 10%, can be found at various depths depending on their characteristics and the ground conditions. Furthermore, it is estimated that over 20% of the UK land mass has been utilised by the military.

Despite efforts to locate and render safe UXO, ongoing discoveries during construction-related ground works continue to occur.

Increased risk awareness and proactive safety measures have reduced the risk to personnel. However, even the discovery of a suspected device can disrupt production and lead to delays and expenses. Site-specific risk understanding and appropriate mitigation measures can help address these risks effectively.

2. Construction Industry Duties and Responsibilities

2.1 The UK Regulatory Environment

The construction industry is not legally required to control and mitigate UXO risk. However, CIRIA (C681): Unexploded Ordnance (UXO) A Guide for the Construction Industry provides guidelines for good practice and information on managing UXO risk. These guidelines include a process for risk assessment and implementation of site-specific mitigation strategies. While there is no specific legislation for UXO risk, health and safety regulations address the responsibility of the construction industry to protect workers engaged in ground-intrusive operations from foreseeable UXO risks.

2.2 The Health and Safety at Work Act, 1974

The Act places a duty of care on an employer to put in place safe systems of work to address, as far as is reasonably practicable, all risks (to employees and the general public) that are reasonably foreseeable.

2.3 Construction (Design and Management) Regulations 2015

CDM 2015 ensures that health and safety within the construction industry is continually improved:

- Works are sensibly planned and managed.
- Competent staff are engaged in the works.
- Risks are identified and managed.
- All parties cooperate and coordinate activities.
- Communication flows to those who require it.
- Workers are consulted and engaged about risks and how they are being managed.

In line with CDM 2015 legislation, Igne are able to assist parties in their discharge of CDM duties as follows:

- Assist Principal Designers with pre-construction information and risk assessments.
- Assist the Designer with the Designer's Risk Assessment.
- Issue UXO risks as have been identified and manage risks accordingly.
- Assist the Principal Contractor with the construction phase information, in particular risk assessments and mitigation strategies.
- Plan, manage and monitor survey and clearance works under Igne's control.

2.4 Other Legislation

Other relevant legislation includes the "Management of Health and Safety at Work Regulations 1999" and "The Corporate Manslaughter and Corporate Homicide Act 2007".

3. The Role of the Authorities and Commercial Contractors

3.1 The Authorities

The Police coordinate emergency services in ordnance-related incidents on construction sites. They assess the risk and may establish a safety cordon, evacuate the area, and contact the military authorities (JSEODOC – Joint Services Explosive Ordnance Disposal Operations Centre) for investigation or disposal. If no EOD specialist is present, the Police impose precautions and away JSEODOC advice.

The response time from JSEODOC depends on the assessed risk and resource availability. They may remove or dispose of the ordnance on site if deemed necessary, potentially requiring additional cordons and evacuations. In routine cases, JSEODOC may not treat each occurrence as an emergency and may advise the construction company to engage a

commercial contractor for managing the situation and reducing pressure on JSEOD disposal teams.

3.2 Commercial Contractors

In addition to pre-construction site surveys and follow-on clearance work, a commercial contractor is able to provide a reactive service on construction sites. The presence of a qualified EOD Engineer with ordnance recognition skills will avoid unnecessary callouts to the authorities and the contractor will be able to arrange for the removal and disposal of low-risk ordnance. If high risk ordnance is discovered actions will be co-ordinated with the authorities with the objective of causing the minimum possible disruption to site operations whilst putting immediate, safe and appropriate measures in place.

4. This Report

4.1 Aims and Objectives

The aim of this report is to examine the probability of encountering and detonating any explosive ordnance during any intrusive works at the site. Risk mitigation measures will be recommended in line with the CIRIA C681 guidelines, to reduce the risk of detonating UXO, and the subsequent risk of harm / damage during the envisaged works to as low as reasonably practicable (ALARP).

This report is a live document and should be updated if any new information comes to light after issue.

4.2 Risk Assessment Methodology

The following issues will be addressed in the report:

- The probability that the site was contaminated with unexploded ordnance.
- The probability that unexploded ordnance remains on site.
- The probability that ordnance may be encountered during any intrusive works.
- The probability that ordnance may be detonated.
- The consequences of detonating or encountering ordnance.

Risk mitigation measures, appropriate to the assessed level of risk and site conditions, will be recommended.

4.3 Approach

In preparing this Unexploded Ordnance Risk assessment, Igne has considered general and, as far as possible, site-specific factors including:

- Evidence of German bombing and delivery of UXBs.
- Site history, occupancy and conditions during WWII.
- The legacy of Allied military activity.
- Details of any known EOD clearance activity.
- The extent of any post war redevelopment.
- Scope of the current proposed works.

4.4 Sources of Information

Igne has carried out detailed historical research for this Unexploded Ordnance Risk Assessment including accessing military records and archived material held in the public domain and in the MoD.

Material from a range of sources has been consulted, including but not limited to:

- The National Archives.
- London Metropolitan Archives.
- Historic England.
- Haringey Archives.
- Landmark Maps.
- Groundsure Limited.
- Relevant information supplied by the client.
- Igne's extensive archives built up over many years of research and hands-on Explosive Ordnance Disposal activities in the UK.
- Open sources such as published books, local historical records and the internet.

4.5 Reliability of Historical Records

4.5.1 General Considerations

This report is based upon research of historical evidence. Whilst every effort has been made to locate all relevant material Igne cannot be held responsible for any changes to the assessed level of risk or risk mitigation measures based on documentation or other information that may come to light at a later date.

The accuracy and comprehensiveness of wartime records is frequently difficult or impossible to verify. As a result, conclusions as to the exact location, quantity and nature of the ordnance risk can never be definitive but must be based on the accumulation and careful

analysis of all accessible evidence. Igne cannot be held responsible for inaccuracies or gaps in the available historical information.

4.5.2 Bombing Records

During WWII, considerable efforts were expended in recording enemy air raids. Air Raid Precautions (ARP) wardens were responsible for making records of bomb strikes either through direct observation or by post-raid surveys. However, their immediate priority was to deal with casualties and limit damage, so it is to be expected that records are often incomplete and sometimes contradictory. Record keeping in the early days of bombing was not comprehensive and details of bombing in the early part of the war were sometimes destroyed in subsequent attacks. Some reports may cover a single attack, others a period of months or the entire war.

Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are not always reliable; records of attacks on military or strategic targets were often maintained separately from the general records and have not always survived.

5. The Site and Scope of Proposed Works

Details for the site and the proposed works are presented in the following table.

Site Address	Dawlish Road, Tottenham Hale, London Borough of Haringey, Greater London, N17 9HN	
OS National Grid Reference	TQ 34011 89840	
Site Description	The site comprises two plots, separated by approx. 10m, along Dawlish Road. In the interest of clarity throughout this report, these have been split into eastern plot and western plot. The western plot consists of hardstanding and small garages, while the eastern plot is a small area of open ground. Scales Road forms the southern boundary of both plots.	
Proposed Works	Proposed works include the construction of a single two-bedroom dwelling on each plot. It is anticipated that the only intrusive groundworks will consist of standard strip foundations and shallow trenches for drainage / utility purposes. However, the client has also advised that deeper boreholes may be required following recommendations from previous site investigations.	
References	Site Location Maps	Figure 1.0
	Recent Aerial Photograph	Figure 2.0
	Site Plan	Figure 3.0

6. WWII Site Conditions

Available mapping and photography were sought for the site, in order to assess site conditions pre, during and post-wartime.

6.1 Pre and Post-WWII OS Mapping

The following historic OS mapping for the site was obtained and reviewed.

	Date	Observations	Reference	Source
Pre-WWII	1936	- Both areas comprise an end-of-terrace residential dwelling, either side of <i>Dawlish Road</i>, each with their own associated garden features. - The surrounding area is urban and residential in character. <i>Scales Road</i> forms the southern boundary of both sites.	Figure 4.1	Landmark Maps
Post-WWII	1955-6	- Significant changes are noted on this post-war OS map, along <i>Dawlish Road</i>, consistent with the effects of wartime bombing. - The plot on the eastern side of <i>Dawlish Road</i> has been cleared. Widespread redevelopment can be observed adjacent to both plots. - The only dwelling remaining from pre-war mapping is the plot located on the western side of <i>Dawlish Road</i>, within the eastern area. - Additional areas of clearance are present in the vicinity, including an area of clearance approximately 25m to the south-west of one of the site.	Figure 4.2	

6.2 WWII-era RAF Aerial Photography

The following WWII-era aerial photography was obtained and reviewed.

Date	17 th June 1941		
Source	Historic England		
Image quality	High Resolution and Medium Scale		
Observations	- This aerial photograph shows widespread clearance across several streets, including along much of the western side of <i>Dawlish Road</i>. - Both dwellings, which form the two plots, remain standing. However, the western site is now isolated, as its adjoining buildings have been cleared (likely as a result of bomb damage) and it may have also sustained some degree of damage itself. - The extent of whether this dwelling sustained damaged cannot be determined. - The eastern plot appears to show some sort of ground disturbance within its garden area; however, its exact nature cannot be determined due to the limited scale of the image.		
Reference			Open Source ²

² https://historicengland.org.uk/images-books/archive/collections/aerial-photos/record/raf_241_ac4_v_0021

Date	10 th June 1947
Source	Historic England
Image quality	High Resolution and Medium Scale
Observations	- This aerial photograph, taken shortly after the war, now indicates widespread clearance on both sides of Dawlish Road, highlighting further bombing activity since the previous imagery of June 1941. - The eastern plot has been cleared. - The remaining, western, plot appears to be the only dwelling standing along either side of Dawlish Road, although the extent of any damage to this structure still cannot be determined.
Reference	Open Source ³

7. The Threat from Aerial Bombing

7.1 General Bombing History of London and Tottenham

7.1.1 First World War

During WWI, London was targeted and bombed by Zeppelin Airships and by Gotha and Giant fixed-wing aircraft. An estimated 250 tons of ordnance (high explosive and incendiary bombs) was dropped on Greater London, more than half of which fell on the City of London.

A WWI bomb census map for the London area (not annexed) does not record any bomb strikes near the site.

WWI bombs were generally smaller and dropped from lower altitudes, leading to shallow UXB penetration. Aerial bombing was a novelty that attracted public interest and spectators. Due to these factors, the risk of undiscovered WWI UXBs is limited. With infrequent attacks and low bombing density, the overall risk is considered low and will not be discussed further in this report.

7.1.2 Second World War

At the beginning of WWII, the Luftwaffe planned daylight bombing raids targeting military installations and later expanded to include economic and industrial sites. Aircraft losses led to a shift to nighttime attacks. The Blitz on London aimed to destroy civilian morale and occurred from September 1940 to May 1941. Minor raids followed in 1942 and 1943, with a larger scale operation in early 1944. The Luftwaffe suffered significant losses due to poor navigation and improved defences.

Between 1940 and 1945, London experienced 71 major air raids, resulting in the dropping of approximately 190,000 bombs and 29,000 fatalities. The V-Weapon campaign in mid-1944

³ Aerial Photo | Historic England

involved unmanned cruise missiles and rockets, causing destruction but with accurate records of strikes. The risk of unexploded V-Weapons on land today is negligible, as evidence of strikes would have been dealt with at the time.

Tottenham was one of the few areas in London that received bombing during the very first raid on the capital on the evening of the 24th August 1940. By the end of the war (in the borough), 646 people had been killed or seriously injured, and over 1000 dwellings had been totally destroyed, with a further 23,155 damaged.

Tottenham was largely residential during WWII, including the area in which both sites are located. However, certain industrial zones nearby were identified as strategic targets. Luftwaffe reconnaissance photography of the Tottenham area indicates that the Tottenham Water Treatment Works, situated approximately 1km east of both plots, had been specifically marked for targeting. It is considered likely that these targets would have been easily identifiable due to the large reservoirs associated with them, as illustrated in **Figure 5.0**.

7.2 Generic Types of WWII German Air-delivered Ordnance

The nature and characteristics of the ordnance used by the Luftwaffe allows an informed assessment of the hazards posed by any unexploded items that may remain today.

HE Bombs	In terms of weight of ordnance dropped, HE bombs were the most frequent weapon deployed. Most bombs were 50kg, 250kg or 500kg (overall weight, about half of which was the high explosive) though large bombs of up to 2,000kg were also used. HE bombs had the weight, velocity and shape to easily penetrate the ground intact if they failed to explode. Post-raid surveys would not always have spotted the entry hole or other indications that a bomb penetrated the ground and failed to explode, and contemporary ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded 50kg bomb. Unexploded HE bombs therefore present the greatest risk to present-day intrusive works.
Blast Bombs / Parachute Mines	Blast bombs generally had a slow rate of descent and were extremely unlikely to have penetrated the ground. Non-retarded mines would have shattered on most ground types if they had failed to explode. There have been extreme cases when these items have been found unexploded, but this was where the ground was either very soft or where standing water had reduced the impact. Igne does not consider there to be a significant risk from this type of munition on land.
Large incendiary bombs	This type of bomb ranged in size from 36kg to 255kg and had a number of inflammable fill materials (including oil and white phosphorus), and a small explosive charge. They were designed to explode and burn close to the surface, but their shape and weight meant that they did have penetration capability. If they penetrated the ground, complete combustion did not always occur, and, in such cases, they remain a risk to intrusive works.
1kg Incendiary Bombs (IB)	These bombs, which were jettisoned from air-dropped containers, were just over 30cm in size and therefore highly likely to go unnoticed. They had the potential to penetrate soft ground and left a very small entry hole. Furthermore, if bombs did not initiate and fell in water or dense vegetation or became mixed with rubble in bomb damaged areas, they could have remained hidden to this day. Some variants had explosive heads, and these present a risk of detonation during intrusive works, particularly due to their shape, which leads them to often be misidentified.

Anti-personnel (AP) Bomblets	AP bombs had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.
Specialist Bombs (smoke, flare, etc)	These types do not contain high explosive and therefore a detonation consequence is unlikely. They were not designed to penetrate the ground.
Examples of the most commonly deployed German bombs are presented at Appendix 1.	

7.3 Second World War Bombing Statistics

The following table summarises the quantity of German bombs (excluding 1kg incendiaries and anti-personnel bombs) falling on the London Borough of Tottenham between 1940 and 1945.

Record of Ordnance Dropped on the London Borough of Tottenham									
Area Acreage	HE bombs (all)	Para-chute Mines	Oil Bombs	Phos. Bombs	Fire Pots	V1	V2	Total	Items per 1000 acres
3,013	283	4	18	-	-	5	3	313	104

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 incendiaries are not particularly significant in the risk they pose, they nevertheless are items of ordnance that were designed to cause damage and inflict injury and should not be overlooked in assessing the general risk to personnel and equipment. The anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous.

7.4 WWII London Bomb Density Map

The bombing density map depicts the concentration of bombs that fell on Greater London throughout WWII. The highest densities were recorded around Central and East London along the River Thames.

Site Location	Tottenham
Bombing Density	High
Bombs Per 1000 Acres	100-149
Reference	Figure 6.0

7.5 Site Specific WWII Bombing Records

7.5.1 London ARP Bomb Census Maps

A review was conducted of The London ARP Bomb Census Maps. Two consolidated maps covering the majority of the Blitz period were produced, in addition to weekly maps dating from the 7th September 1940 up to 18th June 1944. All of the available maps for the site were reviewed. All distances given are approximations from the nearest site boundary.

Note, the street layouts depicted on London ARP Bomb Plot maps are not entirely accurate. In particular, the plot on the eastern side of Dawlish Road is shown as encroaching onto Dawlish Road, whereas in reality it does not. This discrepancy has made the georeferencing of these maps more challenging.

	Date Range	Number of Local Incidents	Weapon	Closest Incident to the Site	Reference
Consolidated	Night bombing up to 07/10/1940	2no.	Parachute Mine HE bomb	60-80m west	Figure 7.1
	Night bombing 07/10/1940 – 06/06/1941	17no.	HE bombs	210m south-west	Figure 7.2
Weekly	25/11/1940 – 02/12/1940	1no.	1kg IB shower	200m south	Figure 7.3

It should also be recognised that the plots are located within Tottenham, which fell under the administrative jurisdiction of Middlesex during the war, rather than London. As a result, bombing incidents in this area may not have been comprehensively recorded within the London ARP Bomb Census mapping. This limitation is supported by local bomb plot mapping for Tottenham, discussed in the following section, which identified a bomb strike on Dawlish Road directly between, and encroaching upon, one of the plots. This incident is not recorded by London ARP Bomb Census mapping.

7.5.2 Tottenham ARP Bomb Plot Map

A section of the local Tottenham Consolidated Bomb Plot Map was reviewed. Details of the map can be seen below:

Number of Local HE Bomb Incidents	Over 20no.
Closest Incident to the Site	Adjacent / On site
Reference	Figure 8.0

This nearest plotted HE bomb relative to the plots is directly between and adjacent to them, on Dawlish Road, even encroaching onto the plot that is situated in the western side of

Dawlish Road. Several other HE bombs are recorded in the vicinity, including along Scales Road, incidents which are not captured by London ARP Bomb Census Mapping.

7.5.3 London V1 Bomb Census Map

Following the beginning of the V1 campaign in mid-1944, a series of maps showing where these weapons fell was produced for the London Civil Defence region and these were updated as the war progressed.

V1 Strike Recorded on Site (or in Vicinity)	x
Distance from Site	The nearest recorded V1 strike relative to both plots is approximately 800-850m north-east, dated 16th June 1944.

7.5.4 Original ARP Bombing Incident Records

Throughout WWII, records of bombing incidents were kept by the ARP and Civil Defence Office. These records were kept in the form of typed or hand-written notes and/or presented on bomb plot maps. Some other organisations, such as port authorities and railways, maintained separate records.

Written ARP records were reviewed for		Tottenham
Source		Haringey Archives
Date	Weapon	Details
07/09/1940	IB	"Markfield Road (rear of) #8.2" Approx. 750m south-east of the plots.
07/09/1940	Unexploded IB	"Markfield Road (rear of) UX #76." Approx. 750m south-east of the site.
08/09/1940	IB	"Holcombe Road #37." Approx. 200m north-east of the site.
08/09/1940	IB	"Scales Road." Scales Road is bounded to both plots from the south. It is unclear where precisely along the road this incident occurred.
13/09/1940	AA	"Parkview x Holcombe Roads." The nearest of these roads, Holcombe Road, is located at the northern end of Dawlish Road.
18/09/1940	3 x IBs	"Chestnut Road... #18." This address is 80-100m south of the sites.

15/10/1940	Oil Bomb	<i>"Scales Road."</i> It is unclear where precisely along Scales Road this incident occurred, it could have occurred in the immediate vicinity of both sites.
27/11/1940	AA	<i>"Ashley x Hale Road."</i>
22/10/1943	Exploded AA	<i>"Park View Road x Scales Road (rear of dam.)"</i>
19/02/1944	Unspecified	<i>"Dawlish Road 1k[illed]."</i> The site is located on Dawlish Road.

7.5.5 Home Office Intelligence Reports

The Home Office Intelligence reports document enemy action on British domestic soil and were prepared twice a day for the Home Security War Room. The summaries were prepared by intelligence staff, who compiled reports received from the twelve civil defence regions.

At least **50No. air raids** were recorded over Tottenham. However, available records only document time and general location of attack and numbers of casualties. The intelligence officials generally only recorded locations on municipal level (town, village, or city), rarely providing specific addresses.

7.5.6 Secondary Source / Anecdotal Evidence

Anecdotal evidence of local bombing incidents was sought from publications and web resources. The following references to incidents on site or in the surrounding area were found.

Date	Weapon	Details
September 1940	Likely HE Bombs	<i>"...last night was a real night. They dropped bombs all around us... Last Wednesday or Thursday they dropped bombs at Bruce Grove."</i>⁴ Bruce Grove is approximately 250m north-west of the site.
Unspecified	Unspecified	<i>"Tottenham was fun for a while, there were bombed-out buildings to explore."</i>⁵ No specific areas within Tottenham are mentioned here.

⁴ https://tottenham-summerhillroad.com/wartimeletters_tottenham_homefront.htm

⁵ <https://www.bbc.co.uk/history/ww2peopleswar/stories/92/a3686592.shtml>

Unspecified	Unspecified	<i>"I was living in Tottenham, North London with my mother, father and sister. Being on the outskirts of London, bombing was always a threat."</i>⁶ No specific areas within Tottenham are mentioned here.
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7.5.7 Bombing Decoy Sites

In July 1940, a national decoy authority led by Colonel John Fisher Turner was established. Urban lighting decoys, known as "Civil" sites, were set up following earlier experiments in Glasgow and Sheffield. These sites, designated as "QL" for urban lighting simulation and "QF" for dummy fires, used electrical and pyrotechnical apparatus to imitate various sources of light and flare. Additional sites simulated small fires caused by incendiary bombs, including special "SF" sites known as "Starfish" sites that attracted enemy bombers away from populated areas and defence installations. Decoy sites were quite successful, with airfield decoys receiving 359 attacks compared to 358 attacks on real airfields by the end of 1941.

A bombing decoy site was established in close proximity to the site	x
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7.5.8 Abandoned Bombs

After an air raid, a survey would be conducted to search for bomb entry holes. If evidence was found, Bomb Disposal Officer teams would be called to locate and dispose of the bomb. However, sometimes UXBs were discovered but could not be accessed or rendered safe due to various reasons. These incidents could be recorded as Abandoned Bombs. Due to inaccurate records and the nature of these abandoned bombs, their locations are not definitive, and the lists may not be exhaustive. The MoD would only take action to make the devices safe if they were deemed unstable. It should be noted that aside from officially abandoned bombs, there may be unrecorded UXBs.

Igne holds records of officially registered abandoned bombs at or in vicinity of the site		x
Additional Comments	The nearest Abandoned Bomb is approximately 1.3-1.4km north-east of the site; a 50kg HE at Marsh Lane.	

7.6 UXB Ground Penetration

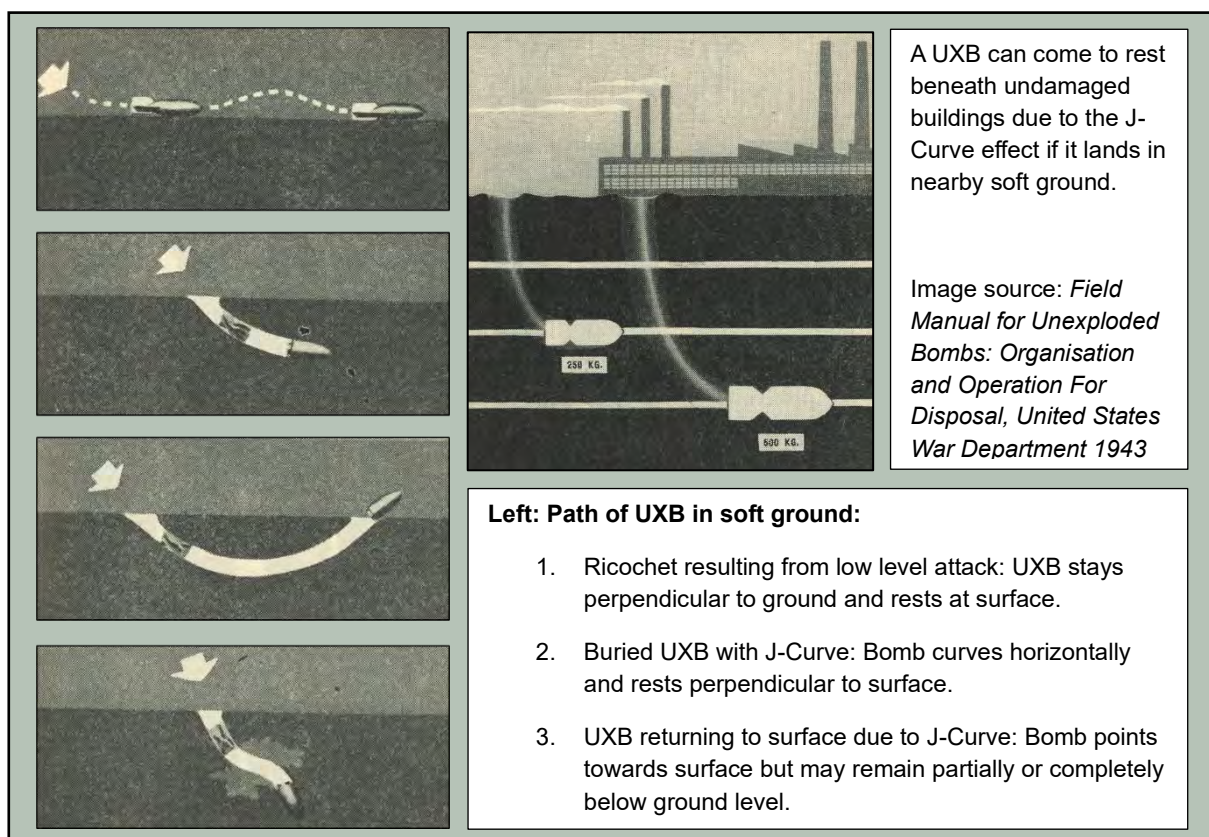
7.6.1 General Considerations

The depth bombs penetrate the ground depends on factors such as their mass, shape, velocity, angle of impact, and the characteristics of the ground cover. Softer ground allows for greater penetration, with peat, alluvium and soft clays being easier to penetrate compared to gravel and sand. Bedrock or large boulders can bring bombs to a stop or cause deflection.

⁶ <https://www.bbc.co.uk/history/ww2peopleswar/stories/80/a4647080.shtml>

7.6.2 The “J” Curve Effect

When an air-dropped bomb is released from a normal bombing altitude (approximately 5,000m), it can reach a terminal velocity of 350-400 ms⁻¹. The bomb enters the earth at an angle of approximately 15° from the perpendicular, making its exact path hard to trace. As the bomb travels through the ground, it undergoes an upward curve due to energy transfer. The slower nose of the bomb experiences more drag/friction compared to the faster-moving rear. This causes the bomb’s location to be offset from the entry hole. The offset is generally one-third of the penetration depth but can reach up to 15m (50’) depending on ground conditions and the bomb’s angle of impact. The J-Curve effect illustrated below demonstrates not UXBs can come to rest beneath undamaged buildings in homogeneous ground.



7.6.3 Second World War Bomb Penetration Studies

During WWII, the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1,328 bombs as reported by Bomb Disposal, mostly in the London area. They then came to conclusions as to the likely average and maximum depths of penetration of different sized bombs in different geological strata.

The table below presents the maximum and average penetration depths observed during this survey. Note, the table includes the most commonly dropped HE bomb sizes, from 50kg to 1000kg.

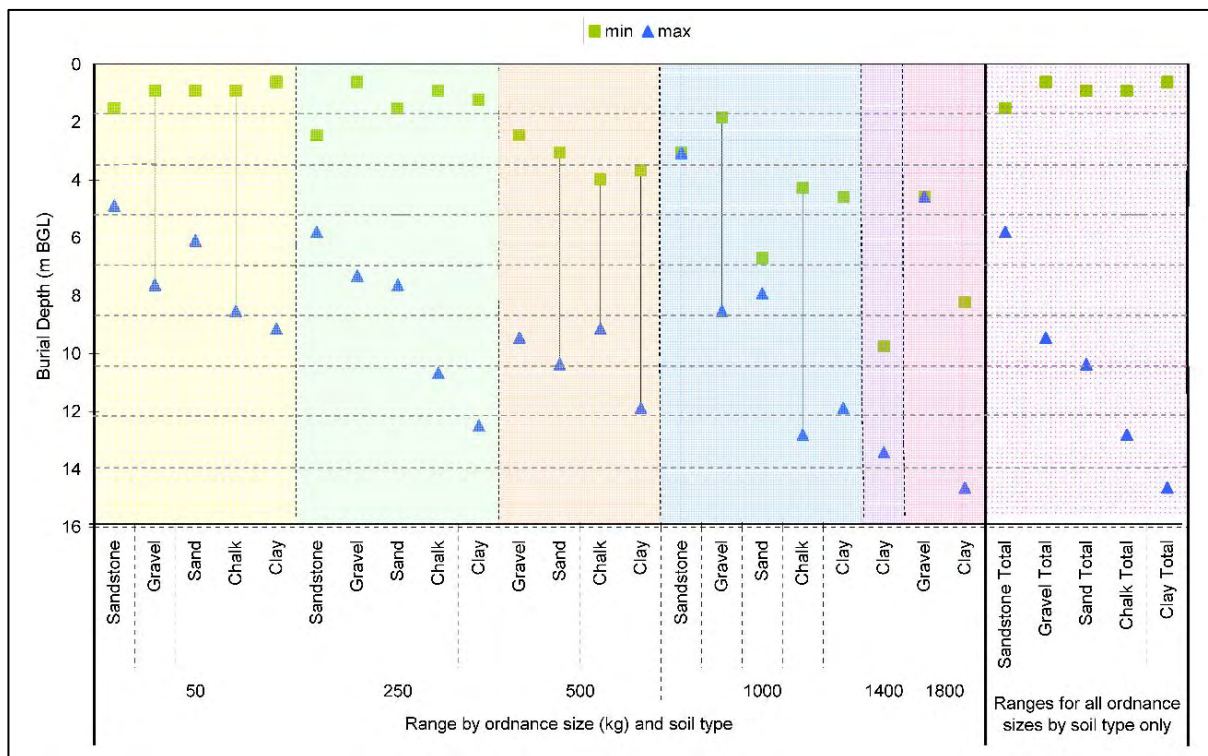
		Bomb penetration depth							
		Max.	Av.	Max.	Av.	Max.	Av.	Max.	Av.
HE bomb size		50kg		250kg		500kg		1000kg	
Ground Type	Sandstone	6.1m	2.7m	10.4m	4.6m	13.1m	5.8m	16.5m	7.3m
	Gravel	7.8m	2.8m	13.7m	4.8m	17.3m	6.0m	21.9m	7.6m
	Sand	7.8m	2.8m	13.7m	4.8m	17.3m	6.0m	21.9m	7.6m
	Chalk	7.7m	3.5m	13.1m	6.0m	16.4m	7.6m	20.7m	9.6m
	Clay	9.1m	4.0m	15.8m	6.8m	19.8m	8.7m	24.9m	10.9m

Note, theoretical calculations suggested that significantly greater penetration depths were probable.

7.6.4 CIRIA Bomb Penetration Depth Specifications

As stated within C681, the ground conditions at any individual site are likely to be highly variable and this results in a large range of burial depths for each different size bomb.

The chart to below shows the observed variation in burial depths of various sizes of air-delivered UXO for different ground conditions.



7.6.5 Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the site, the following parameters would be used:

Parameter	Details		
Geology	British Geological Survey Borehole	Borehole Reference	TQ38NW253 ⁷
		Location	<100m south of the study area
		Date	May 1972
		Recorded Shallow Geology	• 1.5m of Soil, brick and timber (MADE GROUND). • 2.3m of Clay and timber (MADE GROUND). • 2.6m of Brown clay. • 6.45m of Dense gravel with sand. • 9.55m of Firm to very stiff grey clay with sandy and silty layers.
	British Geological Survey Mapping	Superficial Deposits	Enfield Silt Member – Clay and Silt.
		Bedrock	London Clay Formation – Clay, Silty and Sand.
Impact Angle and Velocity	80-90° from horizontal and 267 metres per second		
Bomb Mass and Configuration	The 500kg SC (General Purpose) HE bomb, without retarder units or armour piercing nose. This was the largest of the common bombs used against Britain.		

7.6.6 Deductions

Based on WWII-era studies, a 500kg bomb could have penetrated up to approximately 19.8m below ground level (bgl), with an average depth of around 8.7m bgl. However, considering the varied strata and limited data, it is estimated that the bomb's maximum bomb penetration depth (BPD) during that era was likely between 10-12m bgl, as per CIRIA guidelines.

The current ground level should be evaluated to determine its impact on the BPD. If the UXB is larger, the BPD could potentially be greater, although only 4% of German bombs used in WWII over Britain were of that size.

UXBs can be found at any depth between just below WWII ground level and the maximum BPD. It should be noted that ground conditions can vary significantly on site, and these guidelines may change once on-site conditions are assessed prior to any necessary mitigation works.

⁷ <https://api.bgs.ac.uk/sobi-scans/v1/borehole/scans/items/846027>

7.7 Likelihood of Post-Raid UXO Detection

Utilising the available historical bombing records as reviewed in Section 7.4, it is possible to make an assessment of the likelihood that evidence of UXO would have been noted on a site during the war and the incident dealt with or recorded at the time. Factors such as bombing density, frequency of access, ground cover, damage and failure rate have been taken into consideration.

Factor	General Considerations	Site Specific Considerations
Density of bombing	Bombing density impacts the likelihood of UXBs remaining in an area. A high density of bombs increases the chance of record-keeping errors, due to overwhelmed civil defence and emergency response personnel. It also raises the total number of actual UXBs in a given area. The type and location of recorded bomb strikes are significant factors. If a stick of bombs is plotted in line with or straddling a site, it suggests the possibility of an unrecorded UXB from the same stick hitting that site.	• High bombing density. • At least 50no. raids over Tottenham. • London ARP bomb maps record at least 18no. HE bombs, and a parachute mine within 250m. • Tottenham ARP bomb maps record a HE bomb encroaching onto one plot and directly adjacent to the other. • ARP records indicate IBs in the vicinity. • The site was located near demarcated Luftwaffe target (Tottenham Water Treatment Works; ~1km east). • The site was also in proximity (~300-500m east and west) to railway infrastructure; opportunistic targets.
Bomb damage	In Blitzed cities and towns across Britain, bomb sites were often left uncleared until after the war. Mid-war repairs were focused on vital facilities, while buildings with upper floor damage had their ground floor damage reported and dealt with at the time. HE bomb strikes on open ground created visible craters and soil disturbance. Subsequent UXB strikes in disturbed ground would go unnoticed without identifiable entry holes. The German V1 and V2 campaigns caused widespread devastation in London and south-east England. However, damage from these weapons does not necessarily indicate increased risk of Luftwaffe freefall UXB contamination, as they were used after significant Luftwaffe air raids. Damage from earlier Luftwaffe raids may have been erased by subsequent V weapon strikes.	• WWII-era aerial photographs indicate bomb-attributable clearance on and adjacent to the sites. • This is corroborated by post-war OS mapping, which indicate clearance on one of the plots, and bombing-related redevelopment adjacent to both plots.
Ground conditions	The entry hole of a 50kg UXB (common German HE bomb) could be as small as 20cm in diameter. Records confirm that even small 1kg German incendiary bombs could penetrate soil, leaving tiny entry holes (5cm) or burying completely. During WWII, the quantity and type of ground cover affected the visibility of buried UXBs. Dense vegetation, soft ground, rubble, railway ballast or	• Pre-war OS mapping indicates that both plots were occupied by residential dwellings and their associated gardens.

Factor	General Considerations	Site Specific Considerations
	stockpiled material could obscure evidence. UXB strikes in waterlogged areas or open water would be hidden beneath the waterline. Tidal mudflats or river banks would temporarily cover entry holes with water and sediment. Elevated risk ground cover could cause UXBs to end up beneath neighbouring undamaged buildings or hardstanding due to the “J Curve” Effect. UXB strikes on intact or superficially damaged buildings and hardstanding would cause significant damage or leave easily identifiable entry holes. Well-maintained lawns or gardens are less likely to overlook an HE UXB entry hole, with such incidents reported and the UXB removed.	• In any areas of open garden ground, a UXB strike could have gone unnoticed. • However, as substantial clearance was recorded on sites, it is conceivable that unconsolidated material (i.e. Rubble) was prevalent across the study area. • In such conditions, it is conceivable that a UXB could have landed and gone unnoticed.
Frequency of access	A UXB strike in a site with infrequent human access would have a lower chance of being observed, reported and recorded compared to a developed site with regular access. Strikes during nighttime raids are also more likely to go unnoticed compared to daytime attacks when German aircraft could be detected more easily. In frequently bombed cities / towns, ARP Wardens searched for UXBs in recently bombed residential areas and schools. Important facilities had dedicated ARP teams or Fire Watchers responsible for observing air raids and reporting UXB strikes. However, anecdotal evidence suggests that Fire Watchers were not always present, so their activities cannot be assumed without specific evidence. Less important buildings damaged by bombs would be abandoned until the German bombing campaign ceased, reducing access to those sites. Schools closed due to evacuations were often used as First Aid posts and reception centres, increasing access to those locations.	• Prior to any bombing, dwellings on site are likely to have experienced frequent access. • However, garden features, especially at night / winter, will have seen less access; this could have presented conditions for an unnoticed UXB strike. • Notwithstanding this, evidence of significant bomb damage on the study area suggests that both plots would have been abandoned for a considerable period of time. • As such, it is entirely plausible that UXO strikes in subsequent raids went entirely unnoticed.
German air-delivered ordnance failure rate	Empirical evidence suggests that approximately 10% of German HE bombs dropped during WWII failed to explode as intended. This estimate, based on recovered UXB statistics, likely underestimates the true number as unrecorded UXBs were not accounted for at the time. The reasons for failures include: • Fuze or gaine malfunction due to manufacturing fault, sabotage (by forced labour) or faulty installation. • Clockwork mechanism failure in delayed action bombs. • Failure of the bomber aircraft to arm the bombs (charge the electrical condensers which supplied the energy to initiate the detonation sequence) due to human error or equipment defect.	• No evidence has been found to suggest the ordnance failure rate in this area was higher than 10%.

Factor	General Considerations	Site Specific Considerations
	Jettison of the bomb before it was armed or from a very low altitude. Most likely if the bomber was under attack or crashing. According to War Office statistics, an average of 84 malfunctioning bombs were dropped on civilian targets in Britain per day from 21/09/1940 to 05/07/1941. About 1 in 12 of these bombs, likely those with time delay fuzes, exploded after landing, while the rest unintentionally failed to detonate. From 1940 to 1945 bomb disposal teams dealt with a total of 50,000 explosive items of 50kg and over (German bombs), 7,000 AAA shells and 300,000 beach mines. These operations resulted in the deaths of 394 officers and men. However, UXO is still regularly encountered across the UK. Note, due to manufacturing fault or failure of the bomber crew to correctly arm their munitions, whole bomb loads often failed to detonate. Therefore, the presence of reported UXBs increases the likelihood of an additional unrecorded UXB in the vicinity.	

8. The Threat from Allied Military Ordnance

The following potential historical and modern sources of UXO contamination on site or in the surrounding area have been considered:

- Army, Navy & RAF bases & installations
- Military training areas & weapons ranges
- Ordnance / explosives factories & storage depots
- Sites requisitioned for military use
- Sites used or occupied by the Home Guard
- Military fortifications & coastal defences
- Locations of Army Explosive Ordnance Clearance (EOC) tasks
- WWII heavy and light anti-aircraft batteries
- WWII pipe-mined locations and beach minefields

The risk of contamination from Allied UXO on site is discussed below.

8.1 Land Service and Small Arms Ammunition (LSA/SAA)

It is estimated that around 20% of the UK's landmass has been used by the military at some point. As such, a large proportion of sites can remain at risk from military related UXO, through training, testing, storage, disposal or manufacture.

8.1.1 Defensive Fortifications

After the defeat at Dunkirk in May 1940, Britain rushed to establish defences against the imminent invasion. Coastlines and inland areas were fortified with anti-tank obstacles, ditches, pillboxes and gun emplacements. The goals of these defences were to prevent enemy landings at sea or by aircraft, protect ports and harbours, stop armoured columns from advancing, and safeguard vulnerable locations. Stop lines were created to halt German armoured units, with anti-tank obstacles and pillboxes strategically positioned. The defences were manned by Home Guard and military personnel.

8.1.2 Home Guard Activity

The Home Guard (HG) was a British Army defence organisation active from 1940-44. Comprising 1.5 million local volunteers ineligible for military service, it served as a secondary defence force against enemy invasion. The HG protected coastal areas, important facilities and urban centres. Official records were scarce, making present-day evidence mostly anecdotal. HG personnel conducted training, including weapons training, in rural areas near towns and cities. Present-day discoveries of HG-related ordnance indicate a culture of lax discipline regarding live ammunition. HG members purposefully buried caches of weapons and ammunition in strategic locations for future use, some of which were forgotten and have been found as UXO in recent years. The table below provides several examples:⁸

Home Guard UXO Finds:	
	Live unexploded WWII grenade found in a residential garden, Devon – March 2023
	A cache of phosphorous grenades found buried underneath a school during construction works in Swindon – November 2022
	Unexploded Spigot Mortar Round, used by the Home Guard in WWII, found and disposed of in Hayle, Cornwall – January 2021

⁸ Various News Sources

Home Guard UXO Finds:	
	24 x WWII grenades found buried in a field in Sibton, Suffolk – May 2019
	A cache of 80 phosphorous grenades buried by the Home Guard found in Eastbourne – September 2015
	Home Guard Phosphorous Grenades found buried beneath a bridge in Herne Bay – July 2015

8.1.3 Generic Types of WWII British / Allied UXO (LSA/SAA)

The nature and characteristics of the ordnance used by the military allows an informed assessment of the hazards posed by any unexploded items that may remain today.

Hazard Type	Description		
Land Service Ammunition	The term Land Service Ammunition covers all items of ordnance that are propelled, placed or thrown during land warfare. They may be filled or charged with explosives, smoke, incendiary or pyrotechnics. They can be broken into five main groups: 1. Mortars 2. Grenades 3. Projectiles 4. Rockets 5. Landmines	Mortars	A mortar bomb is a fin-stabilised munition with a nose fuze and its own propelling charge. Additional propellant can be added to increase range. They come in HE or Carrier types and are typically tear-dropped in shape (though older variants may have parallel sides) with a finned 'spigot tube' at the rear housing the propellant. Detonation of a mortar relies on the striker hitting a detonator, which may already be in contact, requiring only slight pressure for initiation. Discarded augmenting charges are commonly found near mortar firing areas/bases.
		Grenades	A grenade is a short-range weapon that can be thrown by hand, fired from a rifle, or launched from a specialised grenade launcher. There are two categories: HE and carrier (typically smoke). Like mortars, a grenade's striker may either be in close contact with the detonator or held by a tensioned spring, so shock can cause it to function. Grenades have an explosive range of 15-20m. Older variants often have a classic "pineapple" shape, while modern grenades are usually smooth-sided.

Hazard Type	Description
	Unexploded or partially unexploded Mortars and Grenades are among the most common items of UXO encountered in the UK. They are commonly encountered in areas used by the military for training and are often found discarded on or near historic military bases.
Small Arms Ammunition	The most likely type of ordnance to be encountered on site are items of SAA (bullets), especially .303" ammunition which was the standard British and Commonwealth military cartridge from 1889 until the 1950s. However even if an item such as this functioned, the explosion would not be contained within a barrel and detonation would only result in local overpressure and very minor fragmentation from the cartridge case. Some LAA guns and RAF fighter cannons in use with British forces during WWII utilised the 20mm round. These bullets had a small fuse and a ~4gram HE or incendiary charge. Although small, this fill quantity still has the potential to cause serious injury.
Examples of the most commonly used British / Allied ordnance types are presented in Appendix 2.	

8.1.4 Site Specific Threat from LSA / SAA

The following table discusses site-specific potential UXO contamination from military activity.

Potential Source	Details
Defensive features within the vicinity	- No defensive features were identified in the site's immediate vicinity. - The nearest defensive features were 2no. Pillboxes, located approximately 800-900m south-east of the sites.
Home Guard Activity on site	- The nearest HG battalions were the 26th Middlesex (Wood Green Battalion, and the 55th Essex (Walthamstow) Battalion. - Available records indicate that the close operating battalion relative to the study area was based in the Wood Green region, over 2km north-west of the site. - It is plausible that a unit may have been active in patrolling the area, particularly alongside the railway line situated approximately 300-400m west of the site. - However, no direct evidence could be found to confirmed HG activity on either of the plots. - Given that the site comprised residential dwellings, which were subsequently cleared as a result of bombing, the likelihood of HG activity (particularly using live munitions) is considered low.

8.2 Anti-Aircraft Gun Batteries

At the war's outset, two types of AAA guns were used: Heavy Anti-Aircraft (HAA) and Light Anti-Aircraft (LAA). LAA batteries targeted fast, low-flying aircraft near airfields and strategic sites. These mobile batteries, equipped with four guns each, could rapidly fire multiple rounds. Unexploded AAA shells from WWII are still occasionally found today.

Initially, the maximum firing height was about 11,000m. However, improved versions of the 3.7" gun and larger 5.25" weapons with higher firing ceilings (over 18,000m) were introduced from 1942.

The 3.7" AA gun was said to have a maximum firing range of around 5.6km when fired horizontally or 12km when fired at an angle. The 5.25" AA gun had a potential maximum firing range of 14.2km, with naval versions capable of reaching up to 22km. Other types, like the 4.5" AA gun and the Bofors 40mm, had a maximum range of approximately 12.5km.

When Switzerland stopped supplying clockwork fuses, Britain had to produce its own. Due to a lack of engineering expertise, many AA shells prematurely detonated, causing casualties or becoming UXBs. In January 1944, more people in London were killed by HAA shells than by German bombs.

Unexploded AA shells are frequently found across the UK. The table below provides several examples:⁹

Anti-Aircraft Artillery UXO Finds:	
	AA shell found in a canal, Ashton-under-Lyne, June 2022.
	AA shell found in the River Great Ouse, Bedford town centre, July 2021.
	Several AA shells found during construction in Somersham, November 2017.

⁹ Various News Sources

	AA shell found in a residential garden, Potters Bar, October 2015.
	AA shell found on a construction site, Waltham Abbey, May 2015.

8.2.1 Generic Types of WWII British / Allied Unexploded Ordnance (Artillery)

The nature and characteristics of the ordnance used by the military allows an informed assessment of the hazards posed by any unexploded items that may remain today.

Hazard Type	Description				
Anti-Aircraft Shells	At the start of WWII, two types of AAA guns were used: HAA with large calibre weapons like the 3.7" QF gun, and LAA with smaller calibre weapons like the 40mm Bofors gun. The Bofors gun could fire up to 120 shells per minute. Due to AAA shortages, older WWI guns were also deployed. These shells, often mistaken for German bombs, can be identified by the copper driving band. Unexploded larger projectiles are found close to ground level and pose a significant risk due to their HE fill and fragmentation. Smaller 40mm projectiles resemble SAA and present a lower risk. Details of the most commonly deployed WWII AAA projectiles are shown below:				
	Gun type	Calibre	Shell Dimensions	Shell Weight	HE Fill Weight
	3.7 Inch	94mm	94mm x 438mm	12.7kg	1.1kg
	4.5 Inch	114mm	114mm x 578mm	24.7kg	1.7kg
	40mm	40mm	40mm x 311mm	0.84kg	70g
Examples of the most commonly used British / Allied ordnance types are presented in Appendix 2.					

8.2.2 Site-Specific Threat from Anti-Aircraft Artillery

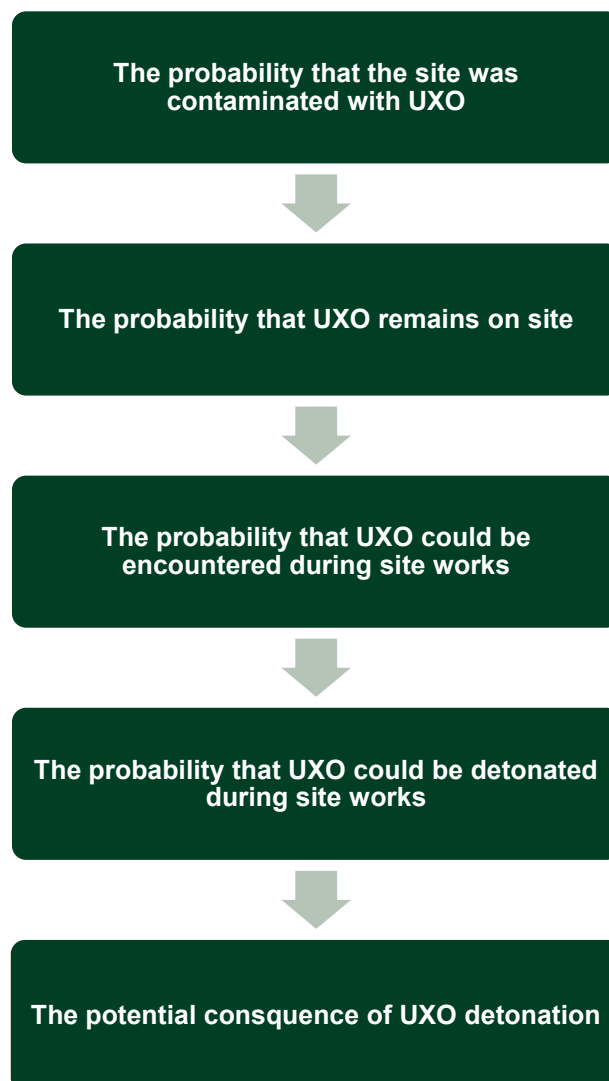
The following table discusses site-specific potential UXO contamination from anti-aircraft artillery.

Potential Source	Details
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Threat to the site from unexploded AA shells	• At least 4No. HAA batteries were recorded within effective firing range of the sites. • It is likely that additional, mobile LAA guns were brought into the area during heavier raid periods. • Given the proximity of plotted strikes, as well as widespread clearance on site, AA fire was likely expended in the direction of both sites on a frequent basis. • ARP records indicate AA shell impacts in roads adjacent to Dawlish Road. • At the start of the war, the site comprised residential dwellings with their associated gardens. • However, substantial wartime clearance on and around both sites implies the presence of unconsolidated material, such as rubble, which would likely have been prevalent within the study area. • Any UX anti-aircraft shell strikes landing on any areas of rubble, or on land subsequently cleared to open ground, may have remained undetected.
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9. Overview of UXO Risk Assessment Methodology

Taking into account the quality and nature of the historical evidence, the assessment of the overall risk to any intrusive works from UXO must evaluate the following factors:



Each of these steps will be evaluated in the following sections in order to conclude the total risk from UXO to the proposed works to be undertaken within the project site.

9.1 The Probability of UXO Contamination on Site

9.1.1 Contamination Factors

The table below presents generalised factors used to determine the probability that the site was contaminated with unexploded ordnance. Note that additional site-specific information can adjust UXO risk beyond these criteria:

Probability of Contamination Definitions		
	German Air-Delivered Ordnance / Allied Anti-Aircraft Shells	British / Allied Land Service or Small Arms Ammunition
Probable	- High local bombing density or evidence of bombing / bomb damage on or adjacent to the site. Confirmed finds of WWII UXB. - Ground conditions that would have immediately and completely obscured the existence of UXB. - Site may be completely obscured from view or subject to very infrequent access.	- Evidence of weapons testing or disposal on or adjacent to the site. - Evidence of UXO finds on or in the vicinity of the site.
Possible	- Moderate to High local bombing density or evidence of bombing / bomb damage on or close to the site. - Ground conditions that allow for bomb penetration. - Site located in an area that was infrequently observed or accessed, with a low likelihood that a UXB strike would have been noticed.	- Clear evidence of military training activity on site involving live ammunition / munitions. - Military sites which have not undergone clearance operations or redevelopment since use. - Evidence of weapons storage on site. - Open or unmaintained ground that may have been used for disposal or caching of munitions.
Unlikely	- No evidence of bombing / bomb damage on site coupled with low local bombing density. - Ground conditions that would prevent UXB penetration or lead to easily identifiable entry holes. - Site was occupied and accessed fully throughout the bombing campaign.	- No evidence of Allied military activity on or near the site. Or - Military sites which have been cleared / redeveloped since their use Or - Military-owned sites which have not been used for training with live munitions. - Developed areas that are unlikely to have been used for military exercises.

The following sections assess the probability of contamination from German UXO and British / Allied UXO, based on the evidence discussed in the previous sections.

9.1.2 The Probability of Contamination from German UXO

The following table discusses the overall probability of contamination from German UXO, based on the evidence discussed in Section 7.

Overview of the Potential Sources of German Air-Delivered UXO		Overall Probability of Contamination
Bombing density	- High bombing density. - At least 50no. raids over Tottenham. - London ARP bomb maps record at least 18no. HE bombs, and a Parachute Mine and IB shower within 250m. - Tottenham ARP bomb maps record a HE bomb encroaching onto one site; directly adjacent to the other. - ARP records indicate IB incidents in the vicinity. - Site was located near demarcated Luftwaffe target - The site was also in proximity to railway infrastructure; opportunistic targets.	Possible
Bomb Damage	- Contemporary aerial photographs show bomb-related clearance on and in vicinity of the site. - Post-war OS mapping shows clearance on one plot and redevelopment adjacent to the both.	
Ground Conditions	- Pre-war OS mapping indicates that both plots were occupied by terrace-end dwellings with gardens. - Recorded site clearance suggests there may have been unconsolidated material (i.e. rubble, debris) on site at some point. - Under such conditions, a UXB could have landed and remained unnoticed.	
Frequency of Access	Study area was likely abandoned following substantial clearance on and adjacent to the sites.	
J-Curve Effect	Had any UXB landed within the soft open ground or rubble on site, it could have come to rest up to 15m from its original entry point, and beneath any buildings yet to have been cleared, such as the plot in the western side of Dawlish Road.	
Other considerations	n/a.	

9.1.3 The Probability of Contamination from British / Allied UXO

The following table discusses the overall probability of contamination from British / Allied UXO, based on the evidence discussed in Section 8.

Overview of the Potential Sources of British / Allied UXO		Overall Probability of Contamination
Land Service Ammunition / Small Arms Ammunition	No direct evidence has been found to suggest that the site formerly had any British / Allied military occupation or usage that could have led to contamination with items of UXO.	Unlikely
Anti-Aircraft Projectiles	- At least 4no. HAA batteries were within effective firing range, with additional LAA guns likely deployed in the area. - The proximity of recorded strikes and evidence of widespread clearance indicate frequent AA fire over both sites. - Wartime clearance on site indicates unconsolidated and / or open ground conditions, making it feasible that an unexploded AA shell remained undetected.	Possible

9.2 The Probability that UXO Remains on Site

9.2.1 General

The extent to which any ordnance clearance activities have taken place on site or extensive ground works have occurred is relevant, since they may indicate previous ordnance contamination but also may have reduced the risk that ordnance remains undiscovered.

9.2.2 EOD Bomb Disposal, Clearance Tasks and UXO Finds

Post-WWII UXO finds are vital, as they can tell us locations where UXO was dropped or buried, the types of munitions used and the numbers that went unnoticed for years after the war ended.

Igne holds a number of official records of explosive ordnance disposal operations during and following WWII, obtained from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD), British Army.

Igne have also sought news articles, publications, anecdotal records and local Igne projects to determine post-WWII UXO encounters on or near to the site.

UXO found	Details
Unspecified 'bomb'	December 2022 – An old device, thought to date from WWII, was found close to Forest Road, approximately 3.7km east of the sites. It could not be confirmed whether this device was German or an Allied source of ordnance. ¹⁰

9.2.3 Post War Redevelopment

The nature of post-WWII ground works, redevelopment and construction has been considered. Significant structural redevelopment on site can, in some cases, provide a level of mitigation, particularly from shallow buried items. However, if a site has not undergone any extent of redevelopment, the likelihood of UXO remaining within its boundaries can remain.

Redevelopment Details
- There has been a limited degree of redevelopment in the post-war period. - Both sites were cleared; however, the site to the east of Dawlish Road has remained as open ground and shows little evidence of post-war redevelopment. - In contrast, the site to the west of Dawlish Road has undergone redevelopment, including the installation of hardstanding, and the construction of small garages. A small patch of open vegetated ground is still present in the southernmost extent of the western plot, indicating minimal redevelopment.

¹⁰ [Walthamstow 'bomb' live: Updates as police and emergency services deal with explosive device - MyLondon](#)

9.2.4 Site-Specific Analysis

The following table discusses the likelihood that UXO could remain on site, following any post-WWII activity.

Mitigating factors during post-WWII period	Evidence indicates that both sites were cleared during or in the 1950s, likely as a result of bomb damage sustained during WWII; however, only of the plots has undergone subsequent redevelopment. The western plot appears to have been redeveloped through the installation of hardstanding and small garage structures. While the maximum depth to which these works were undertaken is unknown during the timeframe of this report, they are unlikely to have involved deep intrusive works. Besides, a small patch of open ground is present on this plot, where no redevelopment appears to have occurred at all. Overall, the available evidence suggests that the site has been subject to either primarily shallow ground works on one plot, and none on the other plot, since the end of WWII.
Further comments	Within the footprints of the post-war redevelopment / ground works, the risk of shallow buried UXO (especially German 1kg incendiaries) remaining will have been partially mitigated since any such items could have been encountered and removed during soil stripping and levelling. As no such works appear to have taken place post-WWII on one of the plots, and, possibly one part of the other, this is considered unlikely. Only within the volume of any post-war basement level bulk excavations and at the precise locations of any post-war pile foundations / boreholes, will the risk from deeper buried German HE UXBs have been completely mitigated. At any location on site where no bulk excavations have been carried out, the risk from deep buried UXO remains unmitigated to the maximum bomb penetration depth.

9.3 The Probability that UXO may be Encountered during the Works

UXO may be encountered during constructions works, particularly piling, drilling or bulk excavations. The risk depends on the extent of the works, such as the number of boreholes / piles, and excavation volume. Shallow excavations near the original WWII ground level may also pose a risk. If the works are within post-WWII fill material, the risk of encountering WWII UXBs is lower. However, the risk significantly increases if the works are below the WWII ground level. The probability of encounter can be determined using the table below.

Probability of Encounter	
1	Rare
2	Unlikely
3	Possible
4	Probable
5	Highly Probable

9.4 The Probability that UXO may be Detonated

Items of ordnance do not become inert or lose their effectiveness with age. Time can indeed cause items to become more sensitive and less stable. This applies equally to items submerged in water or embedded in silts, clays or similar materials. The greatest risk occurs when an item of ordnance is struck or interfered with. This is likely to occur when mechanical equipment is used or when unqualified personnel pick up munitions.

9.4.1 Detonation of Unexploded Bombs

In the case of unexploded German bombs discovered within the construction site environment, there are a number of potential initiation mechanisms:

Direct Impact onto the main body of the bomb	Unless the fuze or fuze pocket is struck, there needs to be a significant impact to initiate a buried HE bomb.
Re-starting the clock timer in the fuze	Only a small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion has taken place within the fuze since the end of WWII that would prevent clockwork mechanisms from functioning, nevertheless it was reported that the fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did recommence.
Induction of a static charge, causing a current in an electric fuze	The majority of German WWII bombs employed electric fuzes. It is probable that significant corrosion has taken place within the fuze mechanism since the end of WWII such that the fuze circuit could not be activated.
Friction impact initiating the (shock-sensitive) fuze explosive	This is the most likely scenario resulting in the bomb detonating.

9.4.2 Activities that may Result in the Detonation of UXO

Unexploded bombs do not spontaneously explode. All high explosive requires significant energy to create the conditions for detonation to occur. The risk that UXO could be initiated if encountered will depend on its condition, how it is found and the energy with which it is struck. However certain activities pose a greater risk than others.

Percussive piling or deep mechanical excavations	The most violent activity on most construction sites is percussive piling or deep mechanical excavations. If an item is struck with a significant enough impact, be it direct or through friction/vibration, it risks detonation.
Shallow excavation	Soil levelling and shallow excavation such as trial pits can pose a similar risk to deeper excavations, since UXO can be found at any depth between ground level and the maximum bomb penetration depth. In addition to risk of initiation by violent impact or vibration, detonation can also occur if discovered items are mishandled by unqualified personnel. This is particularly common when onsite personnel are not trained in the recognition of ordnance.

Non-intrusive works

In the case of non-intrusive planned works, little risk is posed by items of UXO that are buried beneath the ground. However, risk can arise from unburied munitions, particularly items of ordnance discarded in periphery areas of military sites. These items are frequently discovered by onsite personnel and remain live and liable to activate if mishandled.

9.4.3 The Consequences of Encountering or Detonating UXO

An inadvertent detonation of UXO during construction operations would have catastrophic consequences, including a serious risk to life, damage to equipment and a complete site shutdown for subsequent investigations. Appropriate mitigation measures can significantly reduce the risk of initiating ordnance, but the most significant consequence of ordnance discovery is economic, especially in high-profile locations that may require a public evacuation. The unsuspected discovery of ordnance can lead to site closure for a period ranging from a few hours to a week, resulting in substantial lost time costs. Additionally, involving authorities for handling suspected ordnance may further disrupt production, as the police would typically isolate the area while waiting for military assistance, even if it proves unnecessary.

The following table details several recent UK-based UXO incidents:

Recent UK-Based UXO Incidents	
	February 2021-March 2023 – A WWII-era German 1000kg HE UXB was discovered in Exeter, Devon, February 2021. Consequences to the project included: • Halt to construction works while 400m cordon was implemented. • Approximately 2600 properties in the vicinity were evacuated for 2 days. • Structural damage within blast radius during in-situ disposal. • Insurance claim was declined by insurers (March 2023).
	February 2023 – A WWII UXB unexpectedly exploded at the site of a construction project in Great Yarmouth, Norfolk. Consequences to the project included: • Resulted in a 4-day major incident. • Minor damage to the road, and damage to the river wall.
	February 2018 – WWII UXB found in King George V dock, London. Consequences to the project included: • 214m exclusion zone implemented. • Closure of London City Airport with all flights cancelled.

Recent UK-Based UXO Incidents



March 2017 – Construction workers found a WWII UXB in Brondesbury Park, London. Consequences to the project included:

- Evacuation of residents and 2 schools.
- Halt to construction and delays to project.

10. UXO Risk Analysis and Risk Rating

10.1 Risk Analysis Methodology

In order to identify appropriate risk ratings and recommended risk mitigation measures, a semi-quantitative assessment has been undertaken, using all available information discussed in this report.

This risk assessment is designed to determine the level of risk associated with the planned works / actions on site. Igne will identify the hazards and investigate the potential receptor that could be affected. The pathway to the hazard will determine the risk on site. This relationship is usually described as Source – Pathway – Receptor.

Source (or Hazard): Based on the information discussed throughout the report, the most likely potential sources of hazard include:

- HE bombs
- Incendiary bombs
- AA Projectiles
- Land Service Ammunition
- Small Arms Ammunition

Pathway: this is defined as the route in which a hazard could reach the receptor. This will usually include any intrusive ground works.

Receptors: Taking into account the proposed project details, potential receptors could include:

- Personnel (people, workers, engineers, public)
- Equipment & infrastructure
- Environment
- Reputation

An evaluation of the risk rating on site will be determined by several factors; the probability of UXO to remain on site, the probability that it could be encountered / initiated during the proposed works, and the consequences of an accidental detonation. A total risk rating for the site will be determined by considering these factors.

The final risk rating is based upon:

Probability of Encounter (pE) x Consequence of Detonation (cD)

using the definitions below:

Probability of Encounter (pE)		Consequence of Detonation (cD)	
1	Rare	1	Insignificant or Very Low
2	Unlikely	2	Minor or Low
3	Possible	3	Moderate or Medium
4	Probable	4	Major or High
5	Highly Probable	5	Catastrophic or Very High

Consequence Level	Potential Consequences				
	Personnel	Assets and Equipment		Environment	Reputation
		Plant & Equipment	Infrastructure		
1	Minor injury, first aid required	No noticeable impact	No noticeable impact	Minor disturbance	No noticeable impact
2	Injury with time lost (<3 days)	Slight superficial damage	Slight superficial damage	Significant disturbance	Minor impact
3	Serious injury, hospital treatment required	Minor component repair or replacement required	Non-structural repairs required	Moderate damage to habitats	Moderate impact
4	Localised fatalities	Significant component repair or	Structural repairs required	Moderate damage to habitats with	Major impact

		placement required		minor long-term impact	
5	Fatalities over a substantial area	Irreparable damage or loss of unit	Localised structural destruction, collapse or failure	Localised destruction of habitats with moderate long-term impact	Significant Impact

10.2 Risk Matrix

Using the classifications presented in section 10.1, the risk matrix below will be utilized to determine the final risk rating for the site.

		Consequence of Detonation (cD)				
		1	2	3	4	5
Probability of Encounter (pE)	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Risk Ratings Definitions	
High (16-25)	Significant or unacceptable risk. Action required to mitigate the risk before works commence to prevent a significant incident.
Medium (6-15)	Tolerable level of risk if controls lower the risk to ALARP. Workers should proceed with extra caution. Increased monitoring and evaluation required.
Low (1-5)	Acceptable risk. Minimum proactive risk mitigation measures are recommended on site prior to further site works.

10.3 Final Risk Rating & Recommended Risk Mitigation Measures

10.3.1 Risk Rating

The following table discusses the risk rating across the entire site:

Hazard	Average Depth of Hazard	pE	cD	Risk Analysis (pE x cD)	Risk Rating
HE bombs	<12m bgl	3	5	15	Medium
IB (1kg)	<1m bgl	2	4	8	Medium
AA	<5m bgl	3	4	12	Medium
LSA	<2m bgl	1	4	4	Low
SAA	<1m bgl	1	2	2	Low

10.3.2 Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended in order to lower the overall risk during the proposed works to ALARP. Additional information regarding these methods can be found in Section 10.4. In the event of significant additions or alterations to the proposed scope of works, please refer to Section 10.4 for a comprehensive list of risk mitigation details. Furthermore, in the event of any such changes to the proposed works on site, Igne should be contacted to ensure correct mitigation methods are applied based on specific scope of works.

Pathway	Risk Rating	Recommended Risk Mitigation Measure(s)
All	Medium	- Site Specific Explosive Ordnance Safety and Awareness Briefings (UXO Toolbox Briefing) to all personnel conducting intrusive works - Site Specific Safety Instructions (SSSI) Training Course
Shallow Intrusive Works	Medium	Explosive Ordnance Disposal (EOD) Engineer On-Site Support (Watching Brief)
Deep intrusive works	Medium	- Support to Borehole Drilling - Intrusive Magnetometer Survey of all pile locations down to the maximum bomb penetration depth

10.4 Risk Mitigation Overview

An overview of Risk Mitigation Measures is presented below.

Site-Specific Proposed Works	Risk Mitigation Measures	Further Detail
All	Site Specific Explosive Ordnance Safety and Awareness Briefings (UXO Toolbox Briefing) to all personnel conducting intrusive works	These briefings are intended to make site operatives aware of the nature of explosive ordnance that may be encountered on their project site. - Delivered by a specialist Explosive Ordnance Disposal Engineer. - Provides information on the site-specific explosive ordnance risk. - Basic ordnance identification. - What to do in the event of an encounter with a suspicious object. - Provide UXO response procedures.
All	Site Specific Safety Instructions (SSSI) Training Course	For longer term projects that require Explosive Ordnance Safety and Awareness Briefings as part of the Explosive Ordnance Risk Mitigation measures for the project, SSSIs can be provided to allow nominated site representatives to deliver these briefings after initial training. 2/3-hour presentation and training course. - Delivered by a fully qualified senior EOD Engineer. - Suitable for Project Site Manager HSE representative and supervisors. - Includes briefing pack. This provides a cost-effective solution to ensure that the Explosive Ordnance Safety and Awareness Briefings can be delivered effectively and efficiently to the required standard.
Open excavation Shallow intrusive works	Explosive Ordnance Disposal (EOD) Engineer On-Site Support (Watching Brief)	In areas where the risk posed by the potential presence of explosive ordnance is low or where the conditions are not suitable for pro-active survey, EOD On-Site Support can provide a reactive response to any suspicious object that may be encountered during open excavation works. The presence of the EOD Engineer (sometimes referred to as 'high risk dig wardens') on-site in support of shallow intrusive work allows for a direct monitoring of works using visual recognition and instrumentation and provides an immediate response to reports of suspicious objects or suspected items of ordnance that have been recovered by ground workers. Igne EOD personnel on-site also have the additional benefit of providing Explosive Ordnance Safety and Awareness briefings (UXO TBB) to any staff that have not received them earlier and can advise staff of the need to modify working practices to take account of the ordnance threat. The EOD Engineer will also aid potential incident management which would involve liaison with the local authorities and police should ordnance that presents an explosive hazard be identified. - Specialist Explosive Ordnance Disposal Engineer. - Maintains a watching brief over all excavations.

Site-Specific Proposed Works	Risk Mitigation Measures	Further Detail
		- Provides safety and awareness briefings to construction personnel as required. - Provides immediate identification of any suspicious item that is encountered. - Identifies whether any UXO item is live or inert. - Provides liaison assistance with the relevant authorities when dealing with any live UXO. Avoids on site delays which can be caused by the incorrect identification of a suspect item being potential UXO.
Boreholes	Support to Borehole Drilling	For cost effective risk mitigation for site investigation work, the site operative can conduct intrusive surveys for borehole and window sample locations working in conjunction with the site investigation team. The On-Site Support will also provide a reactive response to any suspicious object that may be encountered during open excavation works. - Works in conjunction with the drilling team to survey all borehole and window sample locations in real-time using a staged drilling and magnetometer survey procedure. - Avoids on site delays which can be caused by the incorrect identification of a suspect item being potential UXO. <i>Technical Information</i> - In optimum ground conditions each survey using the borehole technique will have a 1 metre look ahead capability. - Any steel casing used for borehole surveys will need to be retracted by 3 metres to allow the magnetometer survey to be conducted. Non-ferrous pipe will be required to support the borehole during the survey minimum diameter 60mm (to be supplied by the client).
Shallow intrusive works (max. 2m bgl)	Search & Clear	Where a non-intrusive magnetometer survey is not possible (e.g. wooded areas) Igne can deploy a two-man Explosive Ordnance Disposal Engineer team using handheld magnetometer equipment who will proactively survey either in search lanes or boxes, investigating each reading with the support of an operated excavator. The survey is suited to detecting suspicious ferro-magnetic buried objects that may be munitions and/or explosive ordnance related. All Igne personnel involved with the Search and Clearance Works will be former military personnel who have gained formal NATO Military Explosive Ordnance Disposal Qualifications, having completed training at the Defence Explosive Ordnance Disposal School (DEODS) Chattenden, Kent or similar establishment throughout their military service. The client will be responsible for: - Demarcating the areas to be searched. - Providing services clearance and permit to dig.

Site-Specific Proposed Works	Risk Mitigation Measures	Further Detail
		- Providing operated excavator to access deeper targets if required (Igne can provide this service at additional cost). - Providing coordinates of positions where debris have been identified (if information required in report). - Providing storage for recovered debris. Output will depend upon terrain and contamination (number of readings to be investigated).
Shallow intrusive works (max. 2m bgl)	Non-Intrusive Magnetometer Survey and Target Investigation (greenfield land only)	<i>Non-Intrusive Survey</i> This survey type is designed for use on magnetically 'clean' land commonly referred to as 'greenfield'. Brownfield land is often described as that which has had previous industrial or commercial use. In this context it specifically encompasses sites with are underlain by 'made ground' which may contain metallic contamination. Non-intrusive magnetometry or electromagnetic equipment which is used in the search for buried UXO relies upon the detection of small changes between clear ground and that containing UXO. The technique operates very successfully in environments where there is minimal ground contamination from other sources such as fired bricks, reinforced concrete, discarded scrap metal and buried services. There are also man-made ambient effects on magnetic and electromagnetic non-intrusive survey systems which include moving plant vehicles, power cables, electric trains etc. Non-Intrusive survey is carried out using either total-field or gradiometer magnetometry, dependent upon site conditions. Data is recorded and then interpreted using advanced AGSPRoc software in order to map magnetic fields and model discrete magnetic anomalies (variations in the Earth's magnetic field caused by ferro-magnetic objects electrical fields or geology). The location of such anomalies is determined, and mathematical modelling used to estimate their mass and depth. The survey will also locate any buried

Site-Specific Proposed Works	Risk Mitigation Measures	Further Detail
		services with a magnetic signature and indicate any areas of gross magnetic “contamination” which may indicate the presence of unknown obstructions. Additionally, the survey can provide information on archaeological features. The system can detect the magnetic field from a 50kg WWII air-dropped bomb at a depth of 4m and smaller items such as Land Service Ammunition to depths of up to 1.5m in ground with a low ambient magnetic field. In the case of soft geology, it should be noted that a 50kg high explosive bomb may be buried greater than 4 metres below ground level and therefore may not be detected by the survey. In this instance intrusive surveys may be required. The non-intrusive survey system will be deployed utilising the pedestrian survey frame. The output for the pedestrian frame is estimated at up to 2Ha per day. <i>Technical information:</i> • Client to clearly demarcate area to be surveyed prior to start and highlight any known services/underground obstructions. • Ground must be level, free of obstacles / obstructions and clear of undergrowth. Height of any crops should be no more than 400mm and where crops are present Igne would require written approval from the landowner or client to walk over the site area. • When working adjacent to existing infrastructure the survey may be ineffective due to the ferro magnetic interference caused by passing vehicles and the presence of underground buried services. A site visit may be recommended prior to commencement. • Note: the survey will be ineffective on Brownfield sites due to the magnetic nature of building rubble, which typically masks the weaker magnetic signatures of buried objects. If parts of the site are contaminated, then alternative risk mitigation measures may need to be considered. <i>Target Investigation</i> If a buried anomaly is detected that cannot be discounted as a potential UXO / UXB then the object will need to be investigated to positively identify the item. The process will include; • Specialist two-man Explosive Ordnance Disposal Team. • Combination of manual and mechanical excavation techniques.

Site-Specific Proposed Works	Risk Mitigation Measures	Further Detail
		- Excavator shafting, shoring and dewatering equipment can be provided by Igne if required. - Excavation techniques will be defined and agreed prior to the commence. A factual report with clearance certificate will be issued on completion of the investigation.
Piling	Intrusive Magnetometer Survey of all pile locations down to the maximum bomb penetration depth	Igne can deploy a range of intrusive magnetometry techniques to clear ahead of all the pile locations. The appropriate technique is governed by a number of factors, but most importantly the site's ground conditions. The appropriate survey methodology would be confirmed once the enabling works have been completed. A site meeting would be required between Igne and the client to determine the methodology suitable for this site. Target investigation or avoidance will be recommended as appropriate.

Bibliography

The key sources consulted during this assessment are listed below;

1. Bates, H. E., *Flying Bombs over England*, (Frogletts Publications Ltd. 1994).
2. Clarke, J. N., *Adolf Hitler's Home Counties Holiday Snaps: German Aerial Reconnaissance Photography of London and the Home Counties 1939-1942*, (Nigel J. Clarke Publications. 1996).
3. Dobinson, C., *AA Command: Britain's Anti-Aircraft Defences of the Second World War*, (Methuen 2001).
4. Fegan, T., *The Baby Killers': German Air raids on Britain in the First World War*, (Leo Cooper Ltd. 2002).
5. Fleischer, W., *German Air-Dropped Weapons to 1945*, (Midland Publishing. 2004).
6. Jappy, M. J., *Danger UXB: The Remarkable Story of the Disposal of Unexploded Bombs during the Second World War*, (Channel 4 Books, 2001).
7. Price, A., *Blitz on Britain, The Bomber Attacks on the United Kingdom 1939 – 1945*, (Purnell Book Services Ltd. 1977).
8. Ramsey, W., *The Blitz Then and Now, Volume 1*, (Battle of Britain Prints International Limited. 1987).
9. Ramsey, W., *The Blitz Then and Now, Volume 2*, (Battle of Britain Prints International Limited. 1988).
10. Ramsey, W., *The Blitz Then and Now, Volume 3*, (Battle of Britain Prints International Limited. 1990).
11. Whiting, C., *Britain Under Fire: The Bombing of Britain's Cities 1940-1945*, (Pen & Sword Books Ltd. 1999).

Figures

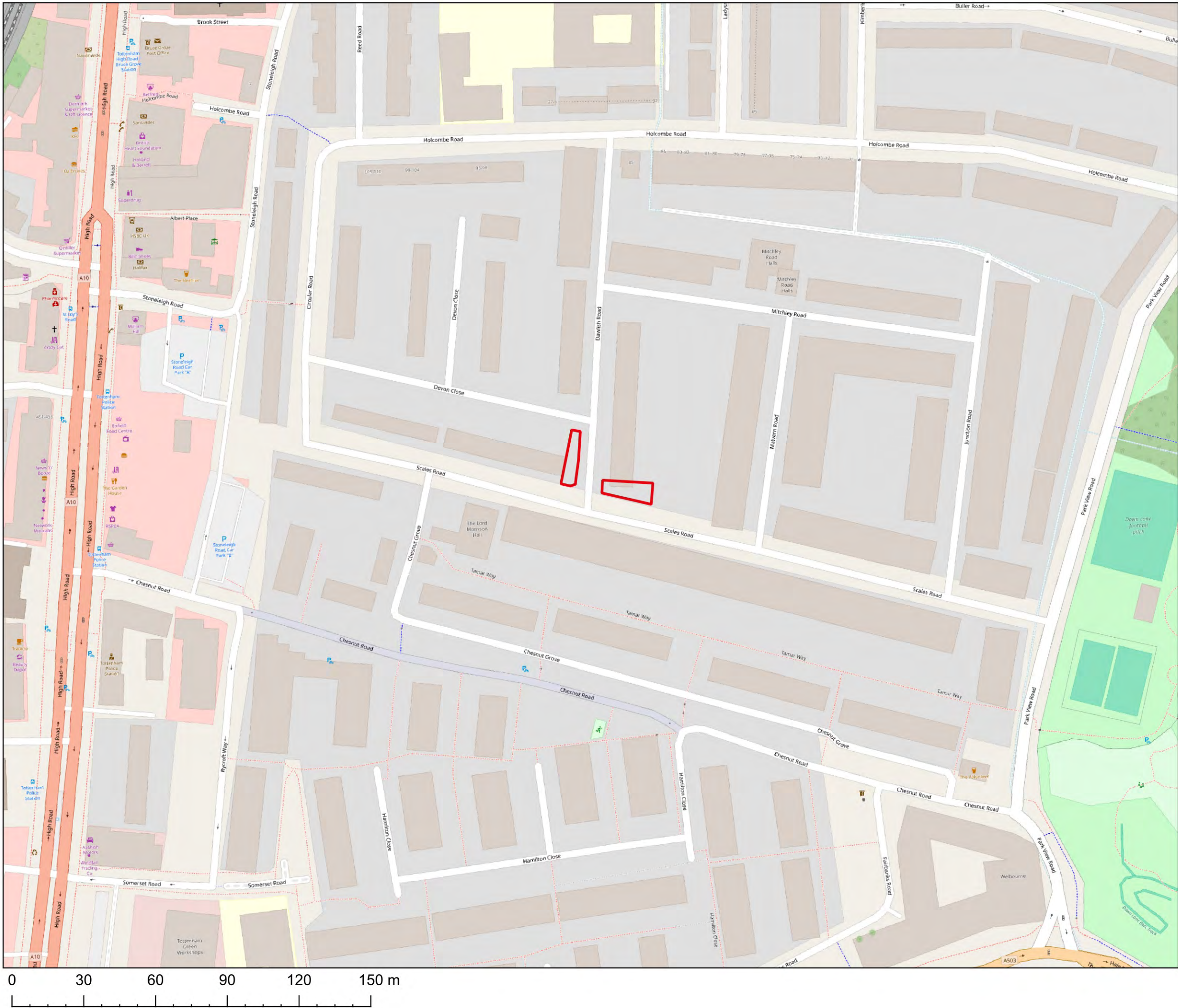
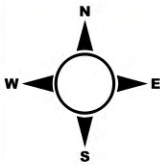
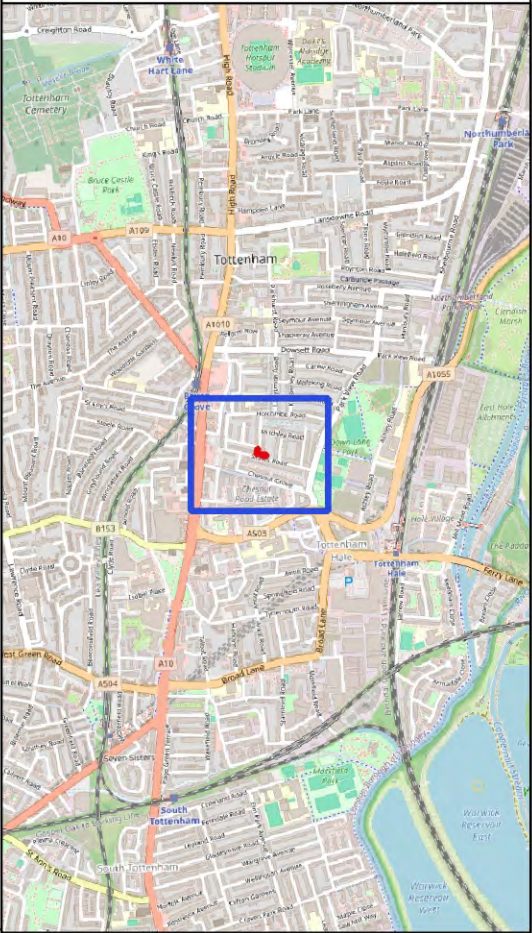


Figure 1.0

Site Location Maps

Key

Site Boundary 



Source:
OpenStreetMap

Document Reference: 10692



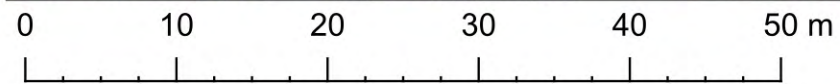
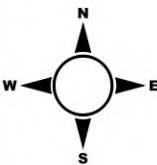


Figure 2.0

Recent Aerial Photograph

Key

Site Boundary



Notes:

Source:
Google Earth Mapping Services

Document Reference: 10692

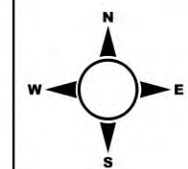


Figure 3.0

Site Plan

Key

Site Boundary



Notes:

Source:
YES Engineering

Document Reference: 10692



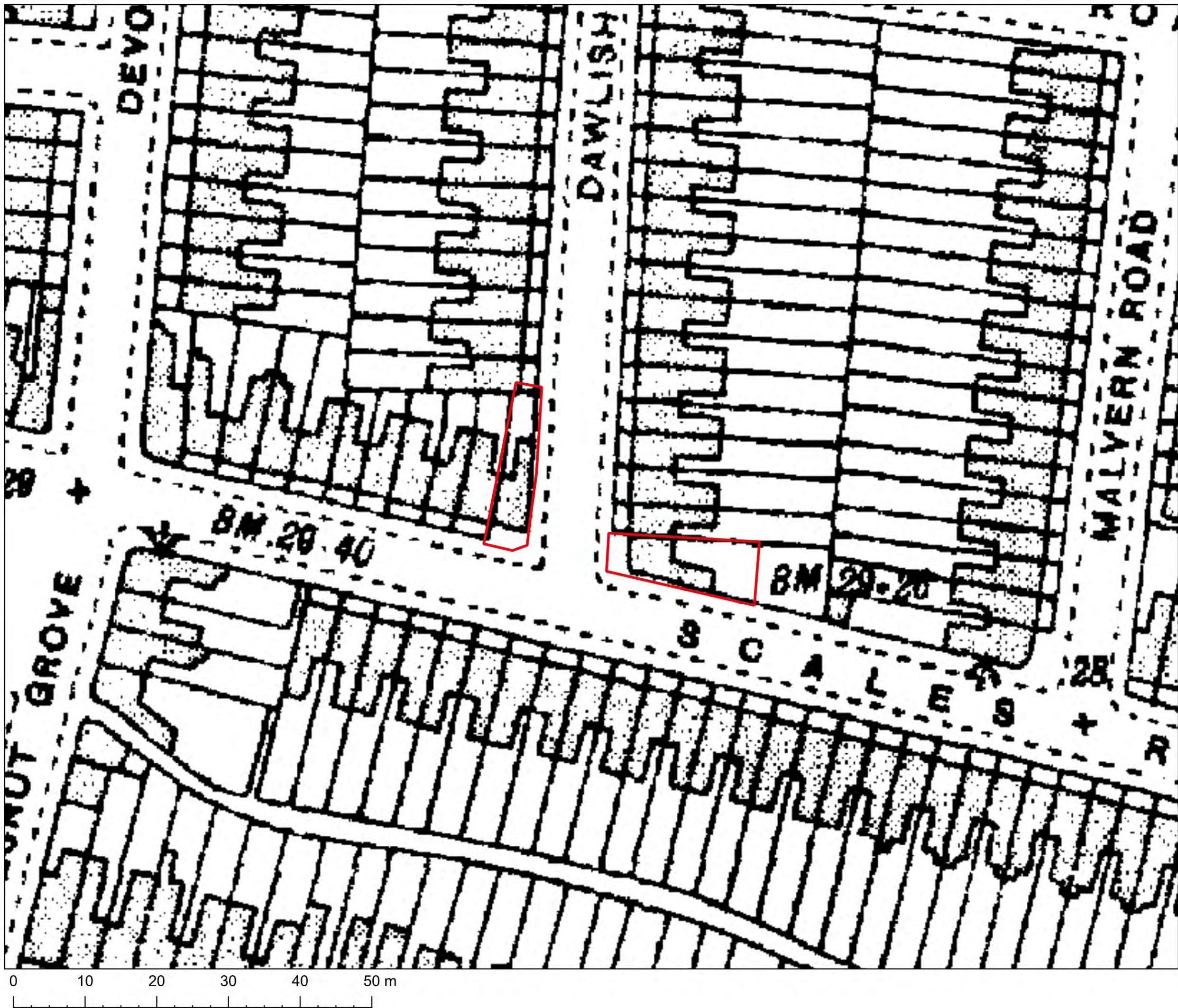
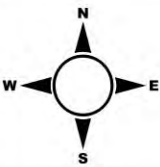


Figure 4.1

1936 OS Map

Key

Site Boundary



Notes:

Source:
Landmark Maps

Document Reference: 10692



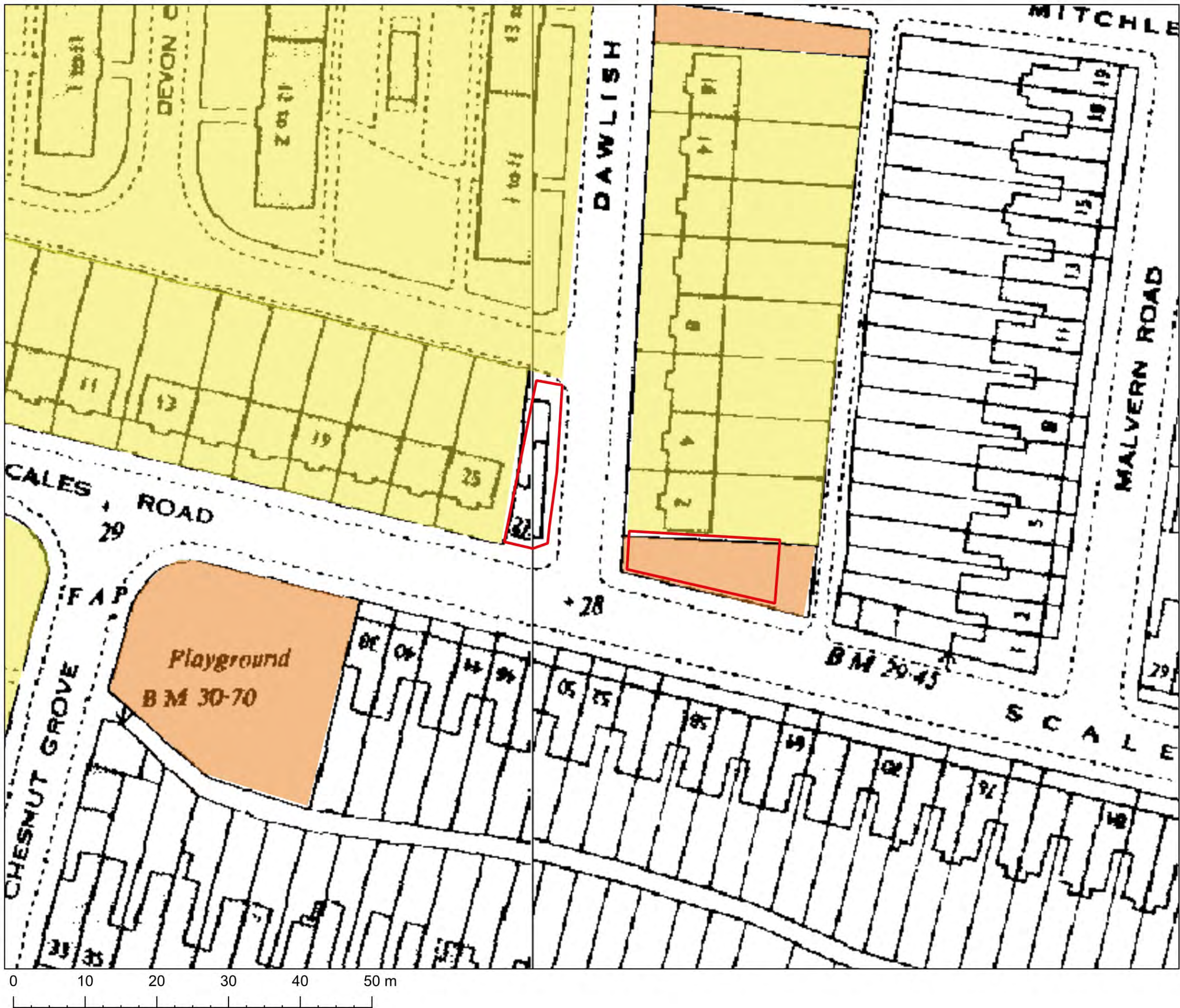


Figure 4.2

1955-56 OS Map

Key

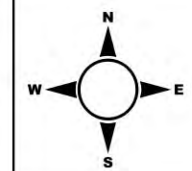
Site Boundary



Clearance



Redevelopment



Notes:

Source:
Landmark Maps

Document Reference: 10692

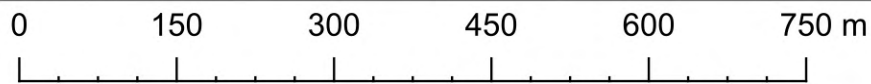


Figure 5.0

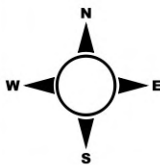
Luftwaffe Target Photo

Key

Site Area



Luftwaffe Target(s)



Notes: The site area encompasses the southern end of Dawlish Road, covering both sites.

Source:
Nigel J. Clarke

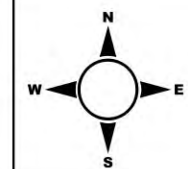
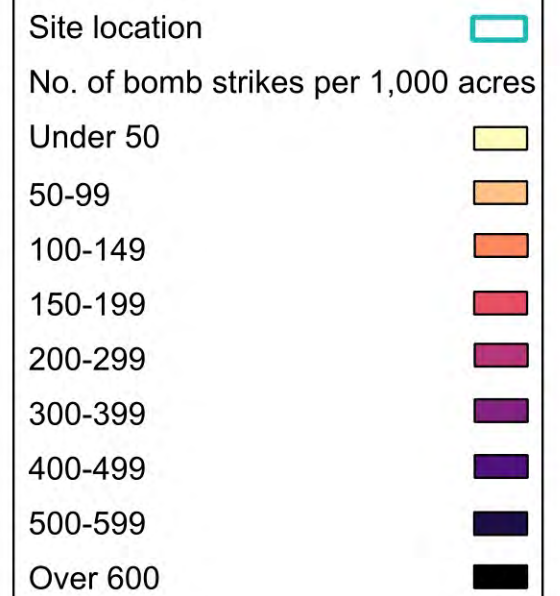
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Figure 6.0

WWII London Bomb Density Map

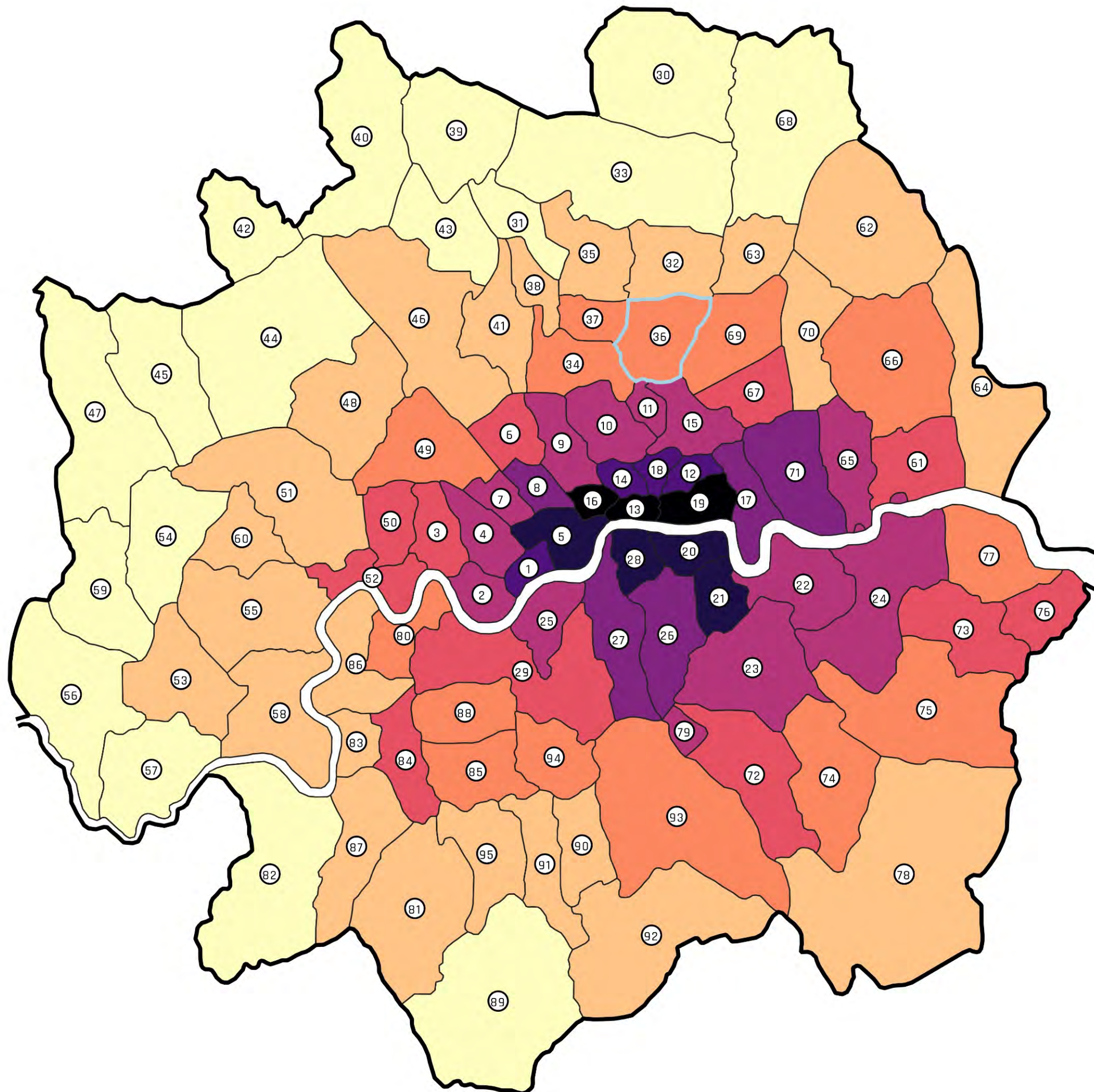
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Notes:

Source:
Igne UXO Limited

Document Reference: 10692



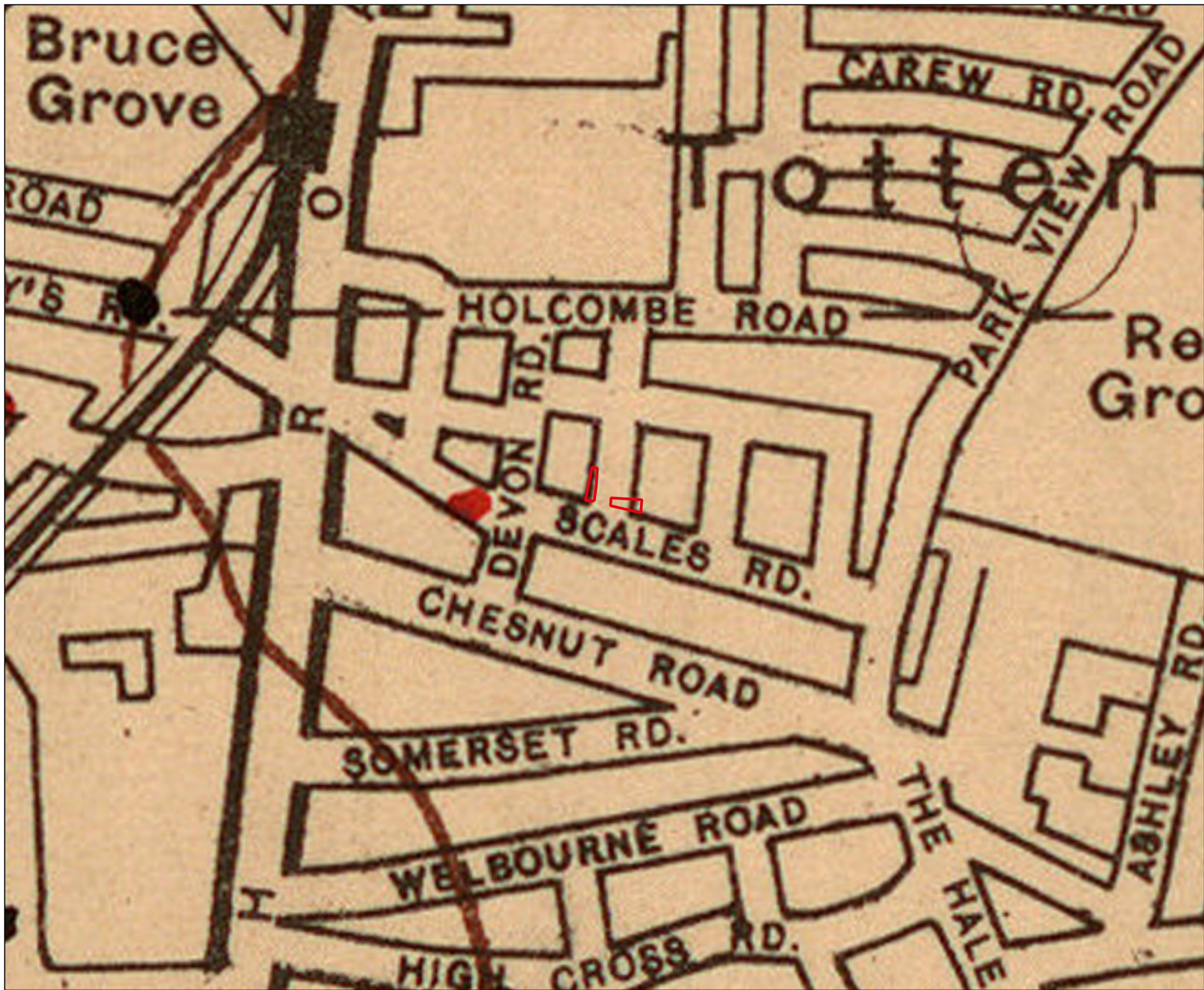


Figure 7.1

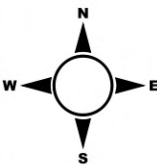
London ARP Bomb Census
Map - Consolidated

Key

Site Boundary 

Parachute Mine 

HE Bomb 



Notes:

Source:
National Archives

Document Reference: 10692



Figure 7.2

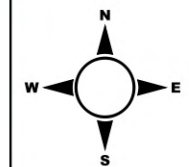
London ARP Bomb Census
Map - Consolidated

Key

Site Boundary



HE Bomb



Notes:

Source:
National Archives

Document Reference: 10692



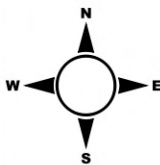
Figure 7.3

London ARP Bomb Census
Map - Weekly

Key

Site Boundary

1kg IB Shower



Notes:

Source:
National Archives

Document Reference: 10692





0 40 80 120 160 200 m

Figure 8.0

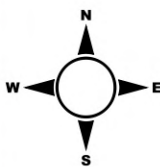
Tottenham ARP Bomb Plot
Map - Consolidated

Key

Site Boundary



HE Bomb



Notes:

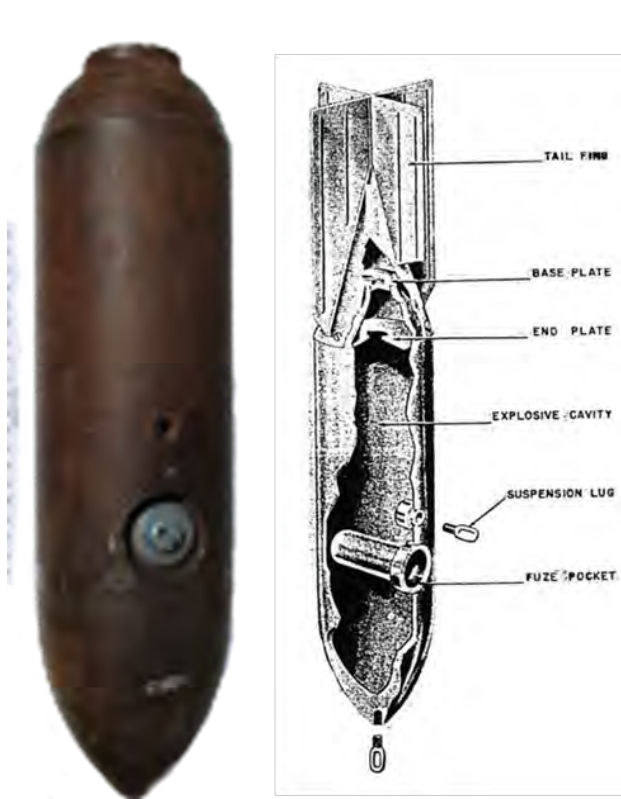
Source:
Haringey Archive

Document Reference: 10692



Appendices

Sprengbombe Cylindrisch 50 (SC50)



Bomb weight: 40-54kg

Fuze Type: Impact fuze / electro-mechanical time delay fuze

Bomb Dimensions: 1090 x 280mm

Body Diameter: 200mm

Use: Used against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to 3-storeys.

Remarks: The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.

SC50 found on site

In May 2015, an SC50 was found at a building site on Empire Way, Wembley, London. (Image source: The Guardian)



Appendix 1.1

Generic Types of German Air-Dropped Ordnance

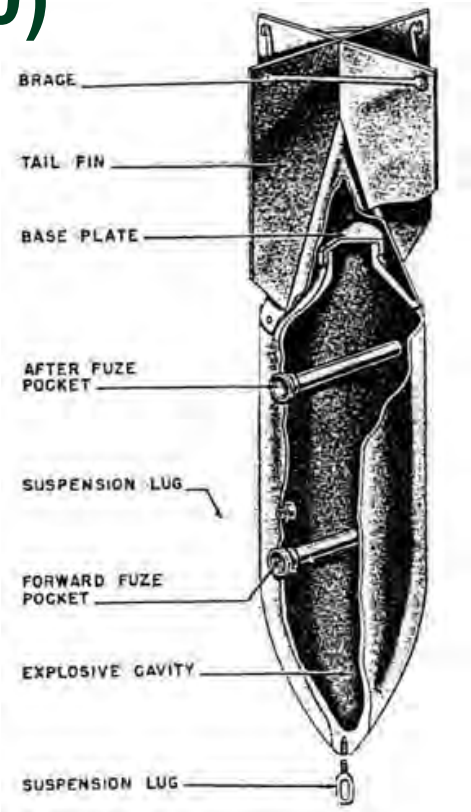
Additional Notes:

Sources:
Various news sources
Open source images



Sprengbombe Cylindrisch 250 (SC250)

Bomb weight: 245-256k
Explosive Weight: 125-130kg
Fuze Type: Electrical impact / mechanical time delay fuze
Bomb Dimensions: 1640x512mm
Body Diameter: 368mm
Use: Used against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations



Appendix 1.2

Generic Types of German Air-Dropped Ordnance

Additional Notes:
The images show SC250 bombs facing upwards in the ground, illustrating the J-Curve Effect.

Sources:
Various news sources
Open source images

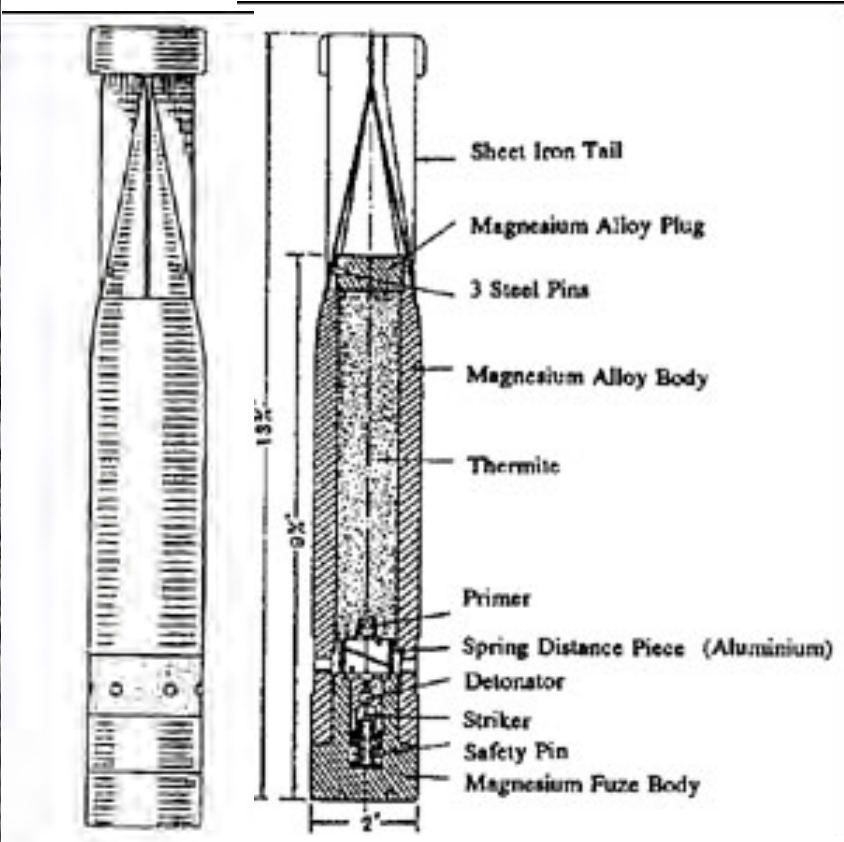


SC250 found on site
In 2000, Igne discovered an SC250 whilst supervising construction work at Hawkinge, Kent.



SC250 found on site
In 2015, a 250kg HE bomb was found on a construction site in Bermondsey, London.

1kg Incendiary Bomb (IB)



Bomb weight: 1.0 & 1.3kg
Filling: 680g Thermite
Fuze Type: Impact fuze
Body Dimensions: 350 x 50mm
Body Diameter: 50mm
Use: As incendiary – dropped in clusters against towns and industrial complexes
Remarks: Jettisoned from air-dropped containers. Magnesium alloy case. Sometimes filled with high explosive charge.



Left: ordinary scaffold pipe
Centre: 1kg incendiary bomb
Right: incendiary bomb found on site in UK

Appendix 1.3

Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

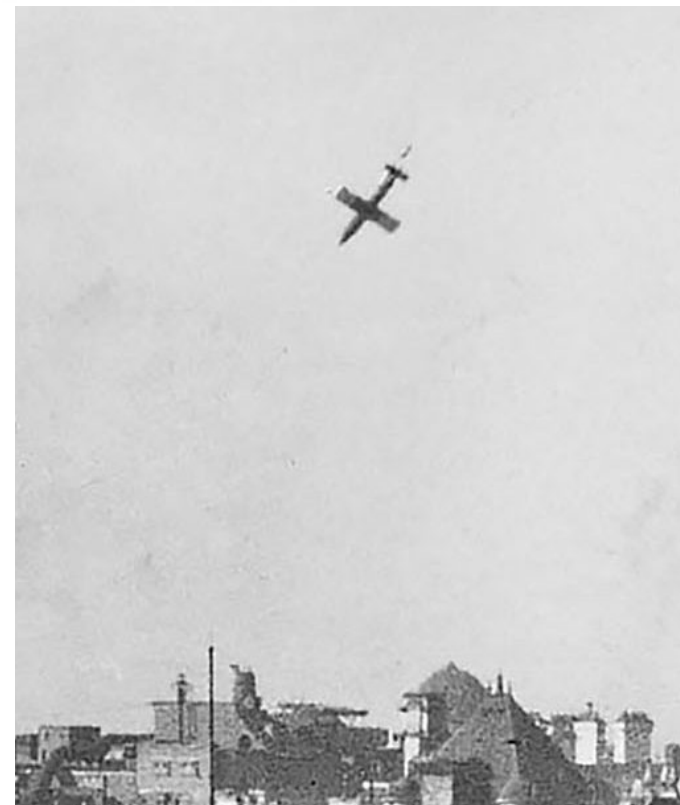
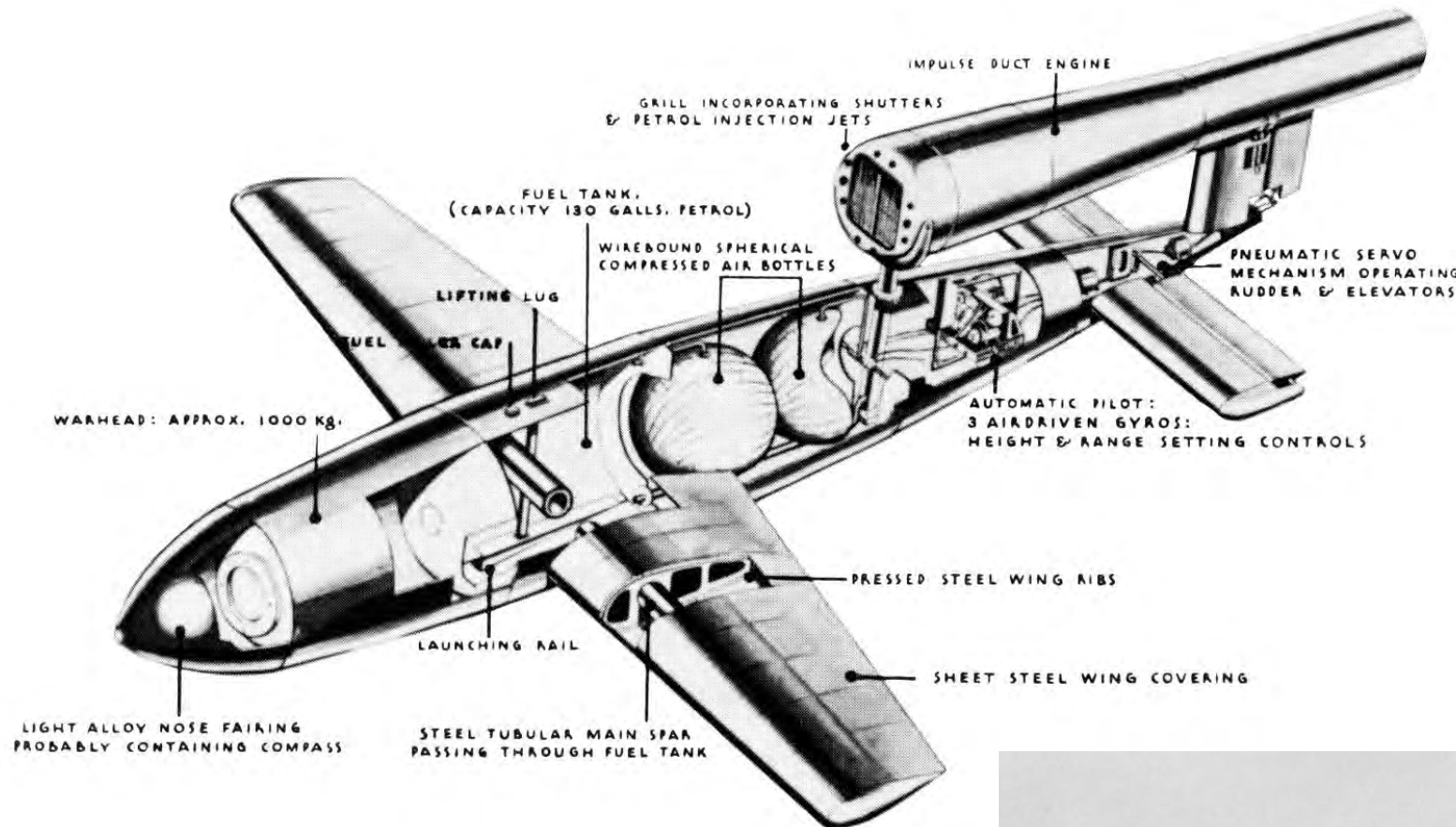
Vergeltungswaffe 1 (V1) “Fly” Bomb

Appendix 1.4

Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images



A V-1 ‘Fly’ Bomb, captured over London, seconds before impacting

Missile Weight: 2,150kg

Fuze Type: Electric Impact Fuze

Missile Length: 8.32m

Width: 5.37m

Range: 250km

Use: Pulsejet-powered guided cruise missile, designed to attack Allied cities.

Remarks: Armed with an 850kg warhead, around 10,000 V-1 flying bombs were fired at England, causing significant damage and killing approximately 6,000 people. There is a negligible risk from unexploded V-1s today, since the remains would have left incontrovertible evidence of the impact.

Vergeltungswaffe 2 (V2) Rocket

Rocket Weight: 12,500kg

Fuze Type: Electric Impact Fuze

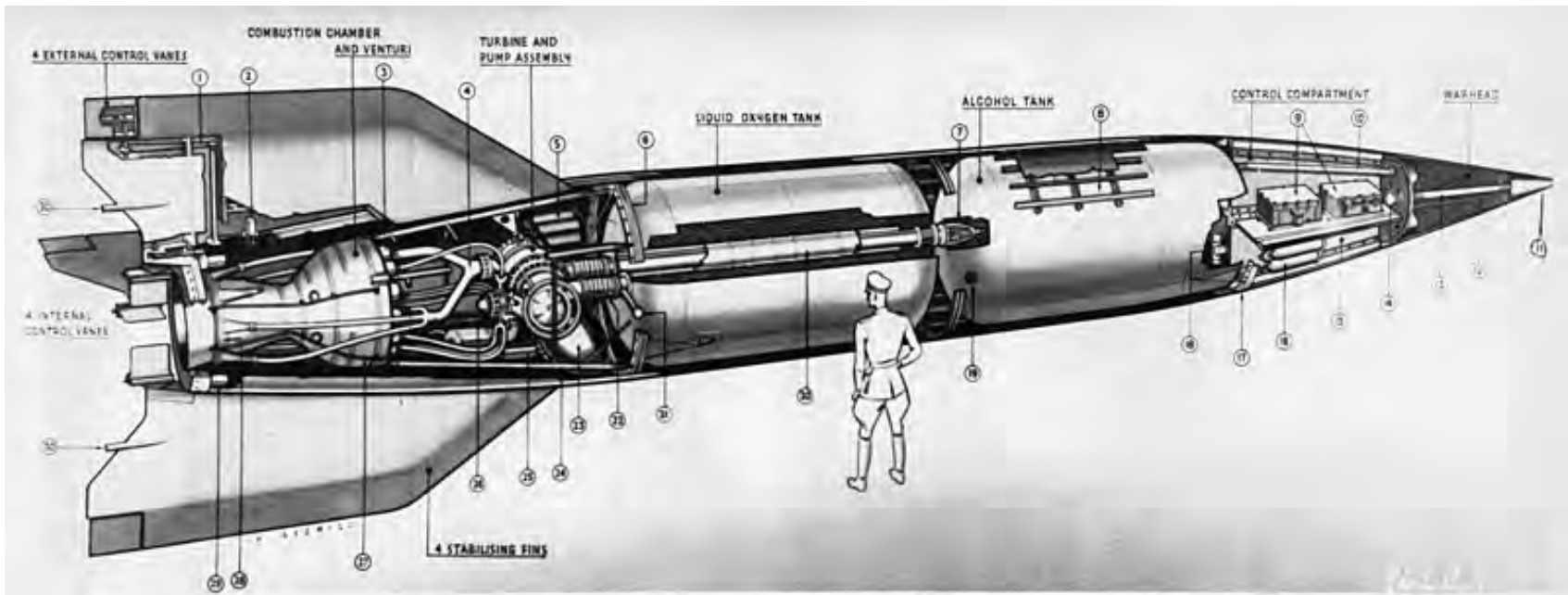
Rocket Length: 14m

Body Diameter: 1.65m

Range: 320km

Use: Long-range ballistic missile, designed to attack Allied cities.

Remarks: Armed with a 975kg warhead and travelling at three times the speed of sound, the V-2 could cause widespread destruction. There is a negligible risk from unexploded V-2s today, since the remains would have left incontrovertible evidence of the impact.



- 1 CHAIN DRIVE TO EXTERNAL CONTROL VALVE
- 2 ELECTRIC MOTOR
- 3 BURNER CUPS
- 4 ALCOHOL SUPPLY FROM PUMP
- 5 AIR BOTTLES
- 6 REAR JOINT RING AND STRONG POINT FOR TRANSPORT
- 7 SERVO-OPERATED ALCOHOL OUTLET VALVE
- 8 ROCKET SHELL
- 9 RADIO EQUIPMENT
- 10 PIPE LEADING FROM ALCOHOL TANK TO WARHEAD

- 11 NOSE PROBABLY FITTED WITH ROSE SWITCH, OR OTHER DEVICE FOR OPERATING WARHEAD FUZE
- 12 CONDUIT CARRYING WIRES TO NOSE OF WARHEAD
- 13 CENTRAL EXPLODER TUBE
- 14 ELECTRIC FUZE FOR WARHEAD
- 15 PLYWOOD FRAME
- 16 NITROGEN BOTTLES
- 17 FRONT JOINT RING AND STRONG POINT FOR TRANSPORT
- 18 PITCH AND AZIMUTH GYRO
- 19 ALCOHOL FILLING POINT
- 20 DOUBLE WALLED ALCOHOL DELIVERY PIPE TO PUMP

- 21 OXYGEN FILLING POINT
- 22 CONCERTINA CONNECTIONS
- 23 HYDROGEN PEROXIDE TANK
- 24 TUBULAR FRAME HOLDING TURBINE AND PUMP ASSEMBLY
- 25 PERMANGANATE TANK (GAS GENERATOR UNIT BEHIND THIS TANK)
- 26 OXYGEN DISTRIBUTOR FROM PUMP
- 27 ALCOHOL PIPES FOR SUBSIDIARY COOLING
- 28 ALCOHOL INLET TO DOUBLE WALL
- 29 ELECTRO-HYDRAULIC SERVO MOTORS
- 30 AERIAL LEADS

Appendix 1.5

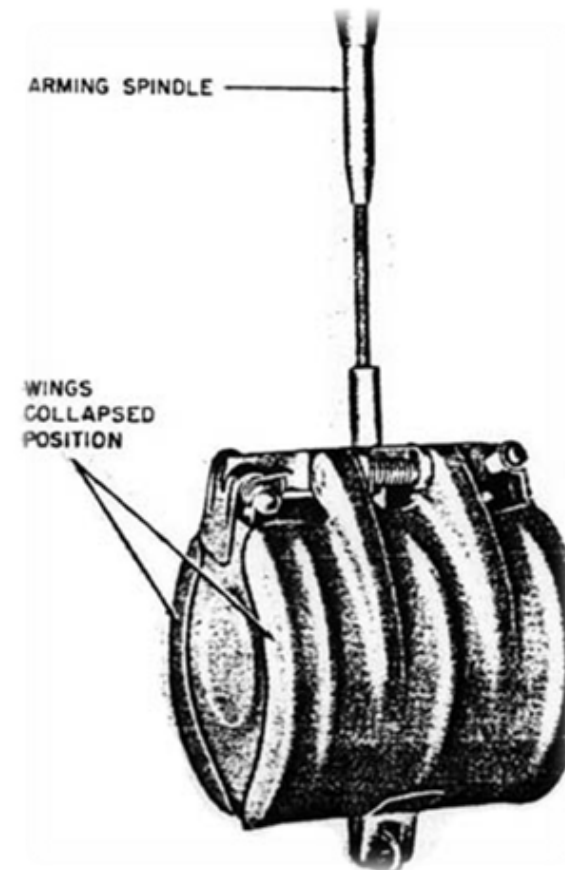
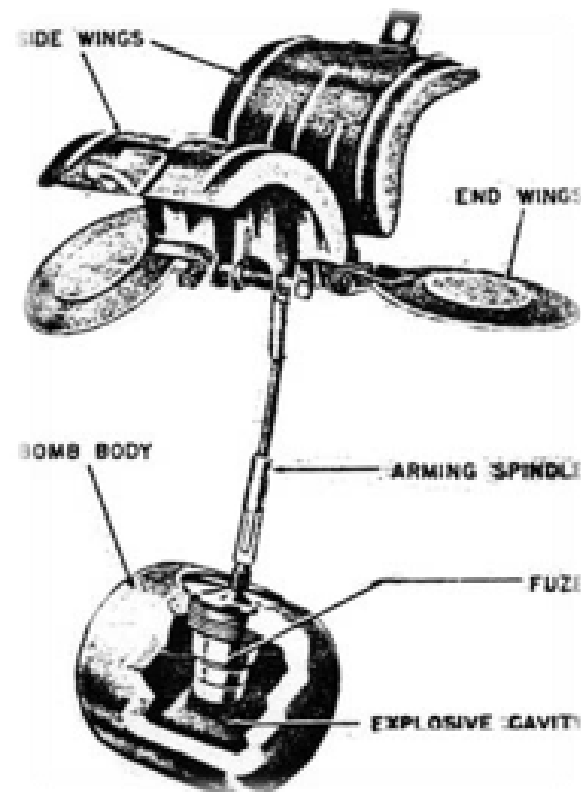
Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

SD-2 & SD-2 B “Butterfly Bomb”

Bomb Weight: 2.0kg
Explosive Weight: 0.225kg
Explosive Filling: 225g of TNT
Fuze Type: Mechanical (41) clockwork fuze only in SD-2
Bomb Dimensions: 200x76mm with cable attachment but without brake airscrews
Bomb Diameter: 76mm
Use: Against living targets and with Störzunder (deterrent fuze) as mine
Remarks: Jettisoned from air-dropped containers. Generally lethal to anyone within a radius of 25m and could injure people as far away as 150m.



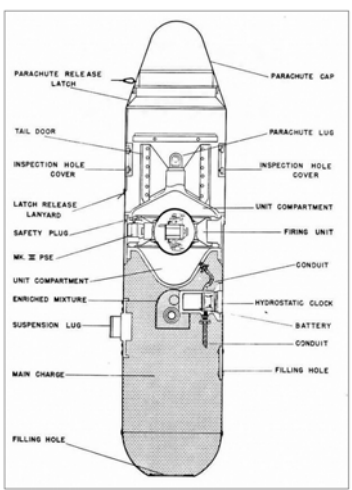
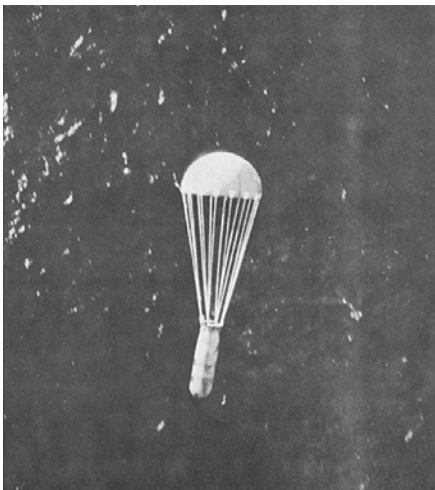
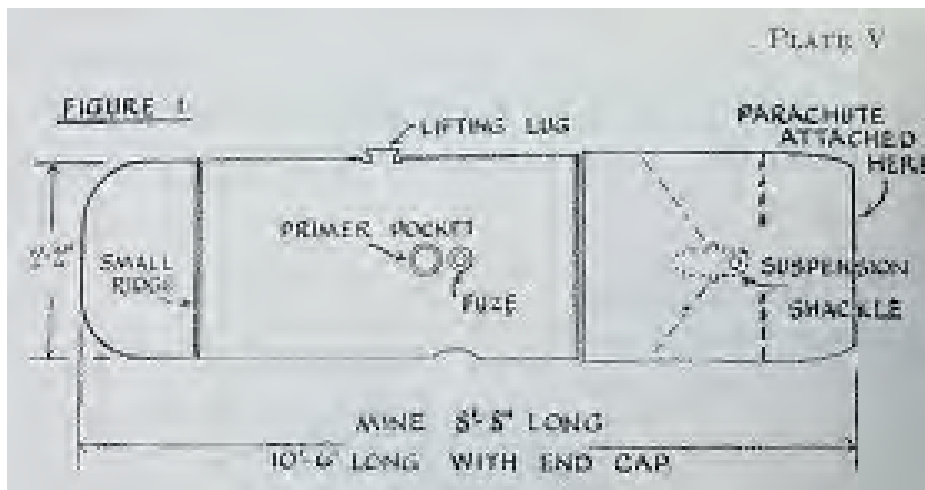
Appendix 1.6

Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

Luftmine A/B “Parachute Mine”



Bomb Weight: A- 500kg, B – 1000kg
Fuze Type: Mechanical clockwork fuze
Bomb Dimensions: A – 1768mm, B – 2682mm
Use: Capable of creating severe blast damage in built-up areas
Remarks: Parachute mines were standard German sea mines fitted with a suitable detonator. They were widely used against British cities.

Appendix 1.7

Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images



Flam C-250 “Oil Bomb”

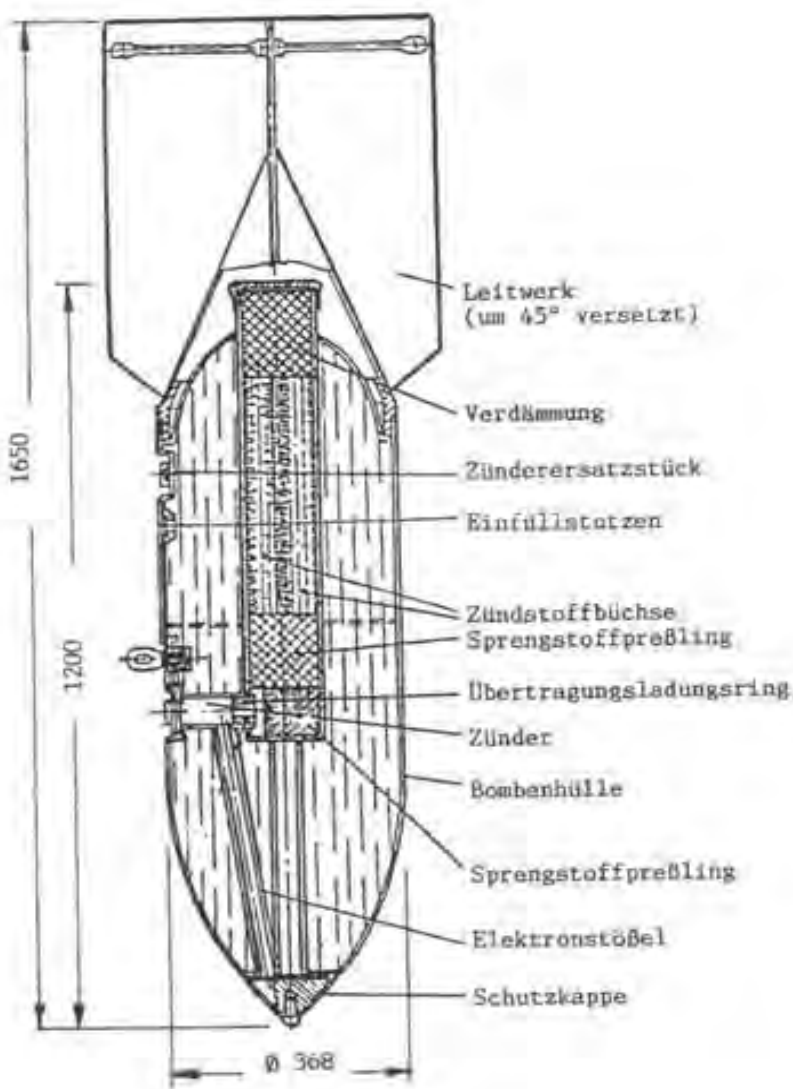
Bomb Weight: 125kg
Explosive Weight: 1kg
Flammable Weight: 74kg
Filling: Mixture of 30% petrol and 70% crude oil
Fuze Type: Super-fast electrical impact fuze
Bomb Dimensions: 1650 x 512.2mm
Body Diameter: 368mm
Use: Often used for surprise attacks on living targets, against troop barracks and industrial installations
Remarks: Thin casing – not designed for ground penetration

Appendix 1.8

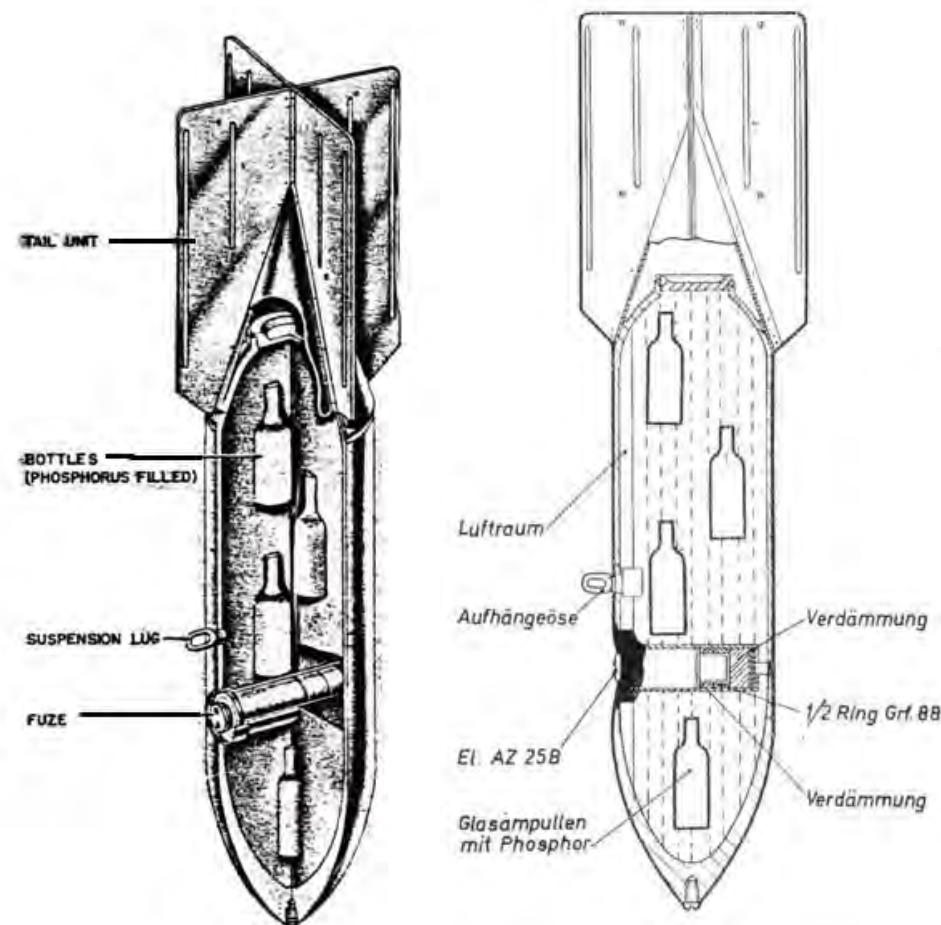
Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images



C-50 A Phosphorous Bomb



Bomb Weight: c.41kg

Explosive Weight: 0.03kg

Incendiary Filling: 12kg liquid filling with phosphor igniters in glass phials

Fuze Type: Electrical impact fuze

Bomb Dimensions: 1100 x 2800mm

Body Diameter: 200mm

Use: Against all targets where an incendiary effect is to be expected

Remarks: Early fill was a phosphorus / carbon disulphide incendiary mixture

Appendix 1.9

Generic Types of German Air-Dropped Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

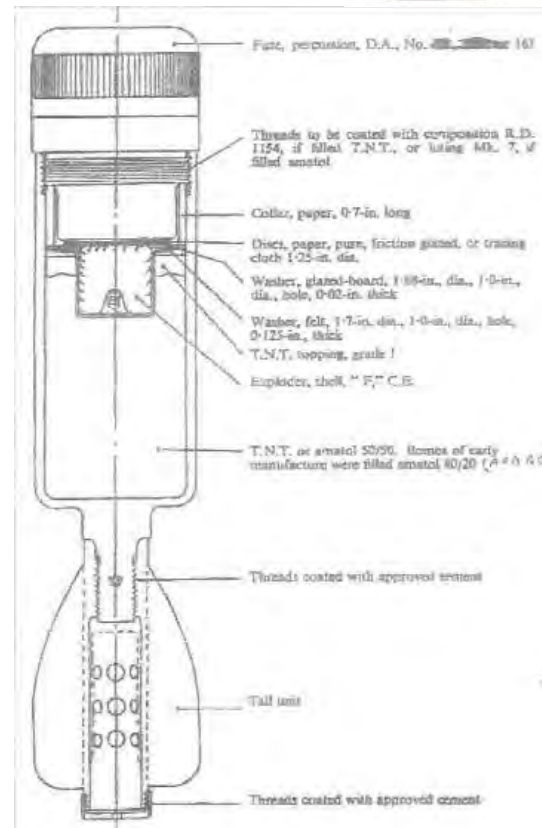
Typical 2" High Explosive Mortar

Bomb weight: 1.02kg

Fuze Type: High Explosive

Bomb Dimensions: 51 x 290mm **Filling:** 200g RDX/TNT

Remarks: Fitted with an impact fuze which detonates the fuze booster charge (exploder) and, in turn, the high explosive charge. The main charge shatters the mortar bomb body, producing near optimum fragmentation and blast effect at the target.



Appendix 2.1

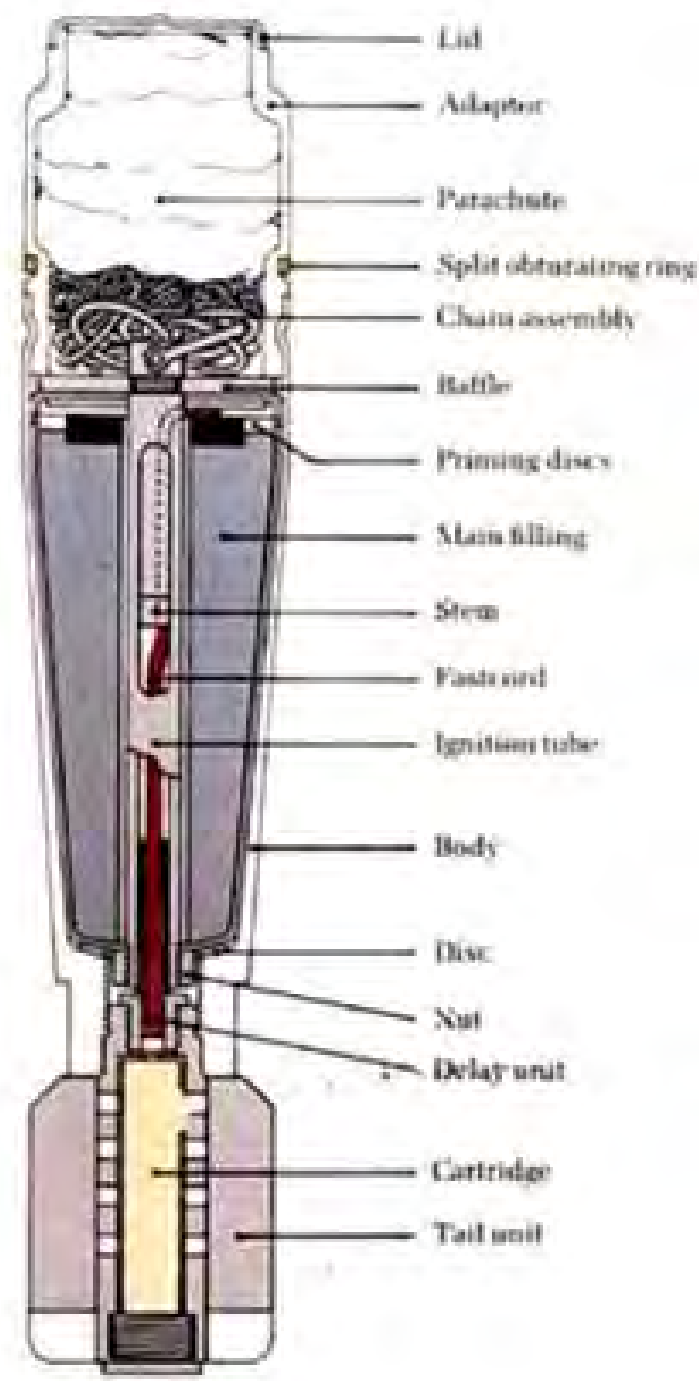
Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

Typical 2” Illuminating Mortar

Fuze Type:
Illuminating
Bomb
Dimensions: 51
x 290mm
Filling: Various
Remarks: The
expulsion
charge ignites
and ejects the
candle
assembly. A
spring ejects the
parachute from
the tail cone.
The parachute
opens, slowing
the descent of
the burning
candle which
illuminates the
target.



Appendix 2.2

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

Typical 3” Smoke Mortar

Fuze Type: Smoke Bomb

Dimensions: c.490 x 76mm

Filling: Typically, white phosphorus

Remarks: On impact, the fuze functions and initiates the bursting charge. The bursting charge ruptures the mortar bomb body and disperses the white phosphorous filler. The white phosphorous produces smoke upon exposure to the air.



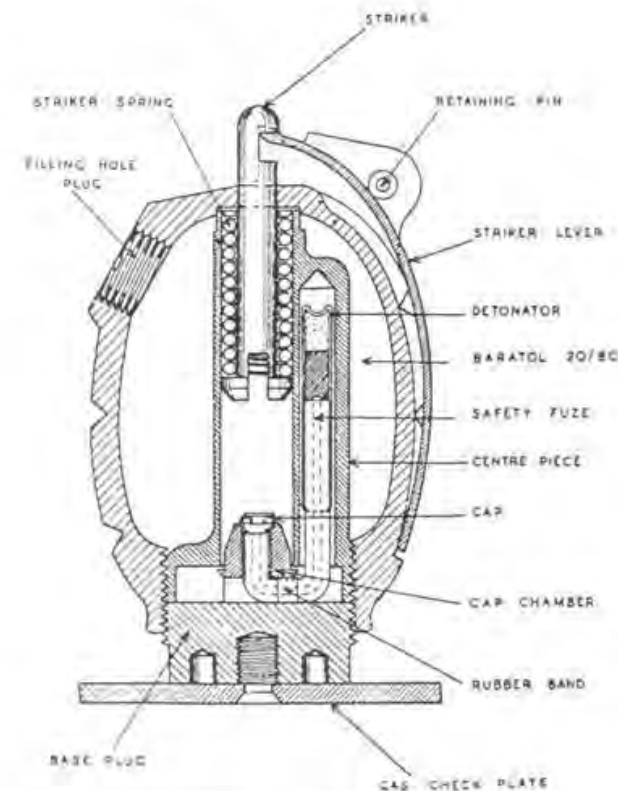
Appendix 2.3

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

No. 36 “Mills” Grenade



Grenade, .303 inch rifle, No. 36M, Mark 1.



Weight: 0.7kg filled
Type: Hand or discharger, fragmentation
Dimensions: 95 x 61mm
Filling: Alumatol, Amatol 2 or TNT
Remarks: 4 second hand-throwing fuze with approximate range of 30m. First introduced May 1918.

Appendix 2.4

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

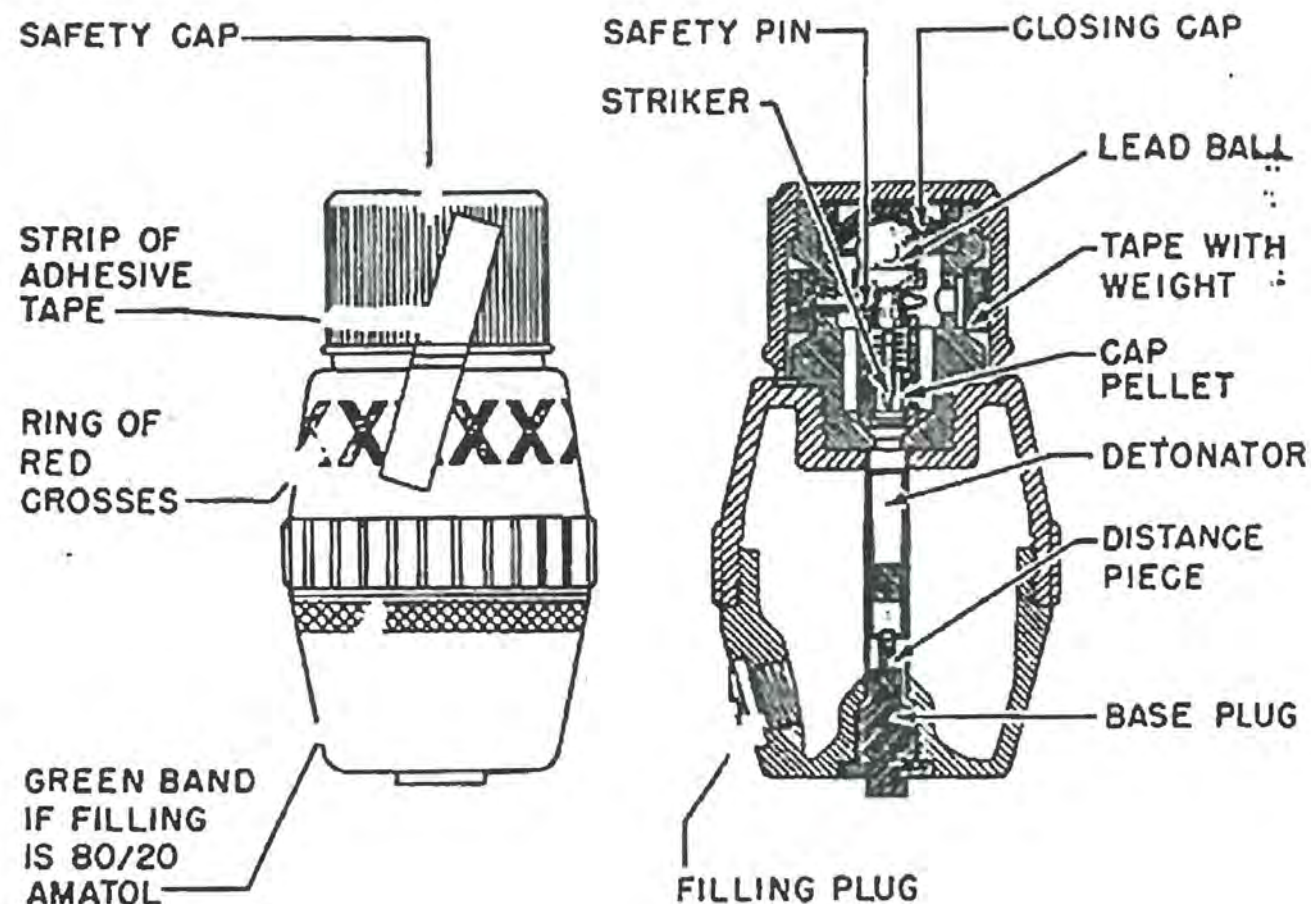
No. 69 Grenade

Weight: 038kg filled

Type: Percussion / Blast

Date Introduced: December 1940

Remarks: Black Bakelite body. Blast rather than fragmentation type. After unscrewing the safety cap, a tape is held when throwing the grenade releasing the safety bolt in the throwing motion. Detection is problematic due to its very low metal content.



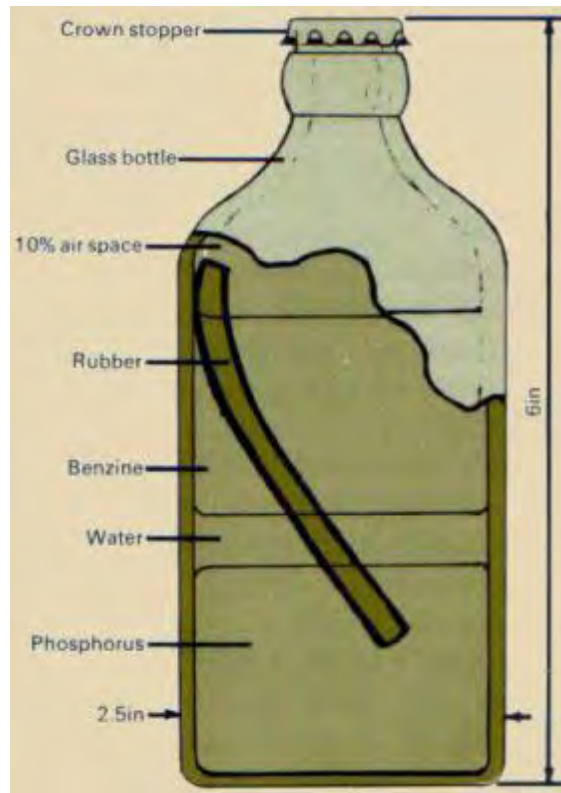
Appendix 2.5

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

Self-Igniting Phosphorous (SIP) Grenade



Sometimes called the “A&W (Albright & Wilson)” grenade.

The grenade comprised a glass bottle with a total volume of approximately 1 pint. It was filled with white phosphorous, benzene, a piece of rubber and water. Over time, the rubber dissolved to create a sticky fluid which would self-ignite when the bottle broke.

Fired by hand or Northover Projector.



Appendix 2.6

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

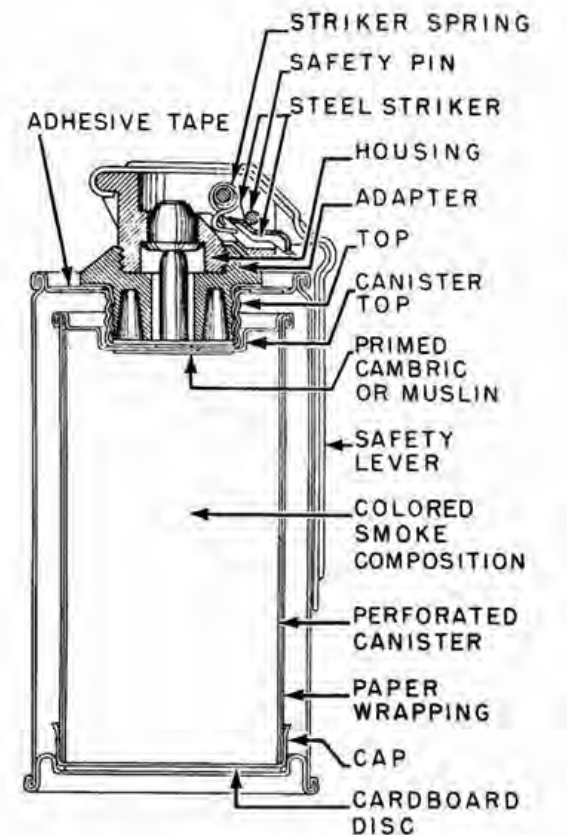
Typical Smoke Grenade

Dimensions: Approx. 65 x 115mm

Type: Smoke

Date Introduced: Current MoD issue

Remarks: Smoke grenades are used as ground-to-ground or ground-to-air signalling devices, target or landing zone marking devices, and screening devices for unit movement.



Appendix 2.7

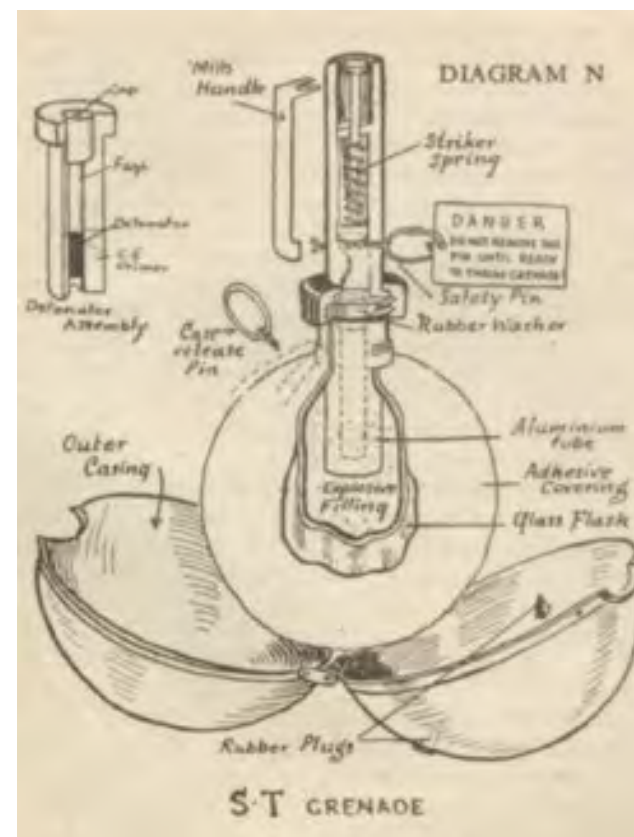
Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

No. 74 Grenade (“Sticky Bomb”)

Designed as an anti-tank grenade and used by the Home Guard. The grenade consisted of a glass ball on the end of a Bakelite (plastic) handle. Inside the glass ball was an explosive filling whilst on the outside was a very sticky adhesive covering. Until used, this adhesive covering was encased in a metal outer casing.



Appendix 2.8

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

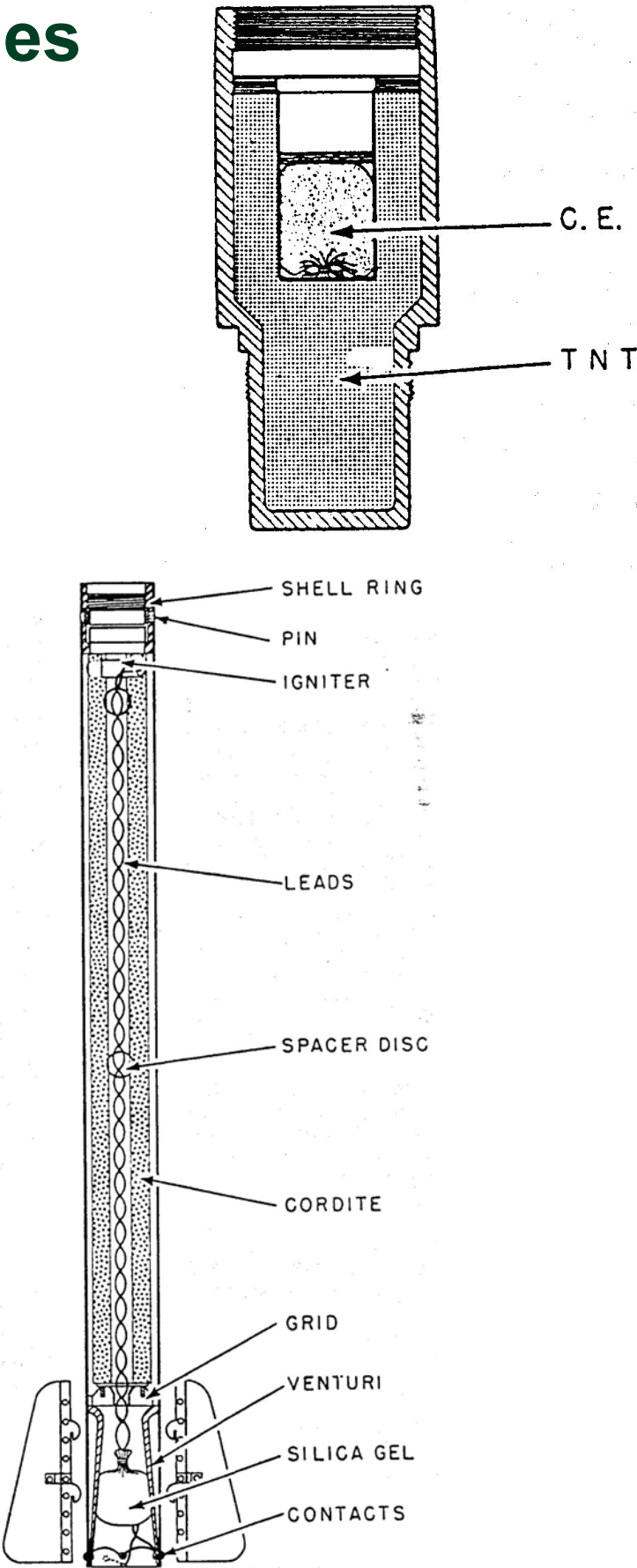
Sources:
Various news sources
Open source images

Rockets / Un-rotating Projectiles

Weight: 24.5kg
Bomb Dimensions: 94 x 360mm
Carriage: Typically, white phosphorus
Rate of Fire: 10-20 rounds per minute
Ceiling: 9,000-18,000m
Muzzle Velocity: 72m/s
Remarks: 4.5" projectiles were also commonly utilized.



Home Guard soldiers load an anti-aircraft rocket at a 'Z' Battery



Appendix 2.9

Generic Types of British / Allied Anti-Aircraft Ordnance

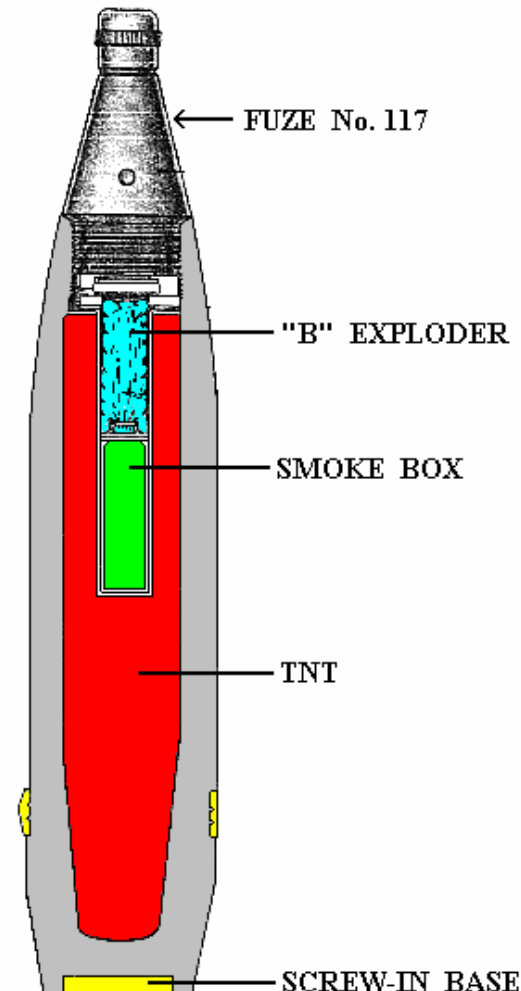
Additional Notes:

Sources:
Various news sources
Open source images

High Explosive Projectile: Fragmentation & Blast

Features:

- a) Long, pointed ogival nose and streamlined body.
- b) Square or tapered base. Boat tailed/streamlined.
- c) One-piece body construction.
- d) Base plate screwed or welded to the base, occasionally of one piece construction.
- e) Copper driving band near the base of the projectile.
- f) Body construction normally thin.
- g) Low charge to weight ratio.
- h) Fuzed with point-initiating and/or base-detonating fuze.
- i) If no driving band is present, it may use two bourrelets.



4in HE Projectile



2in HE Projectile

Appendix 2.10

Generic Types of British / Allied Land Service Ammunition

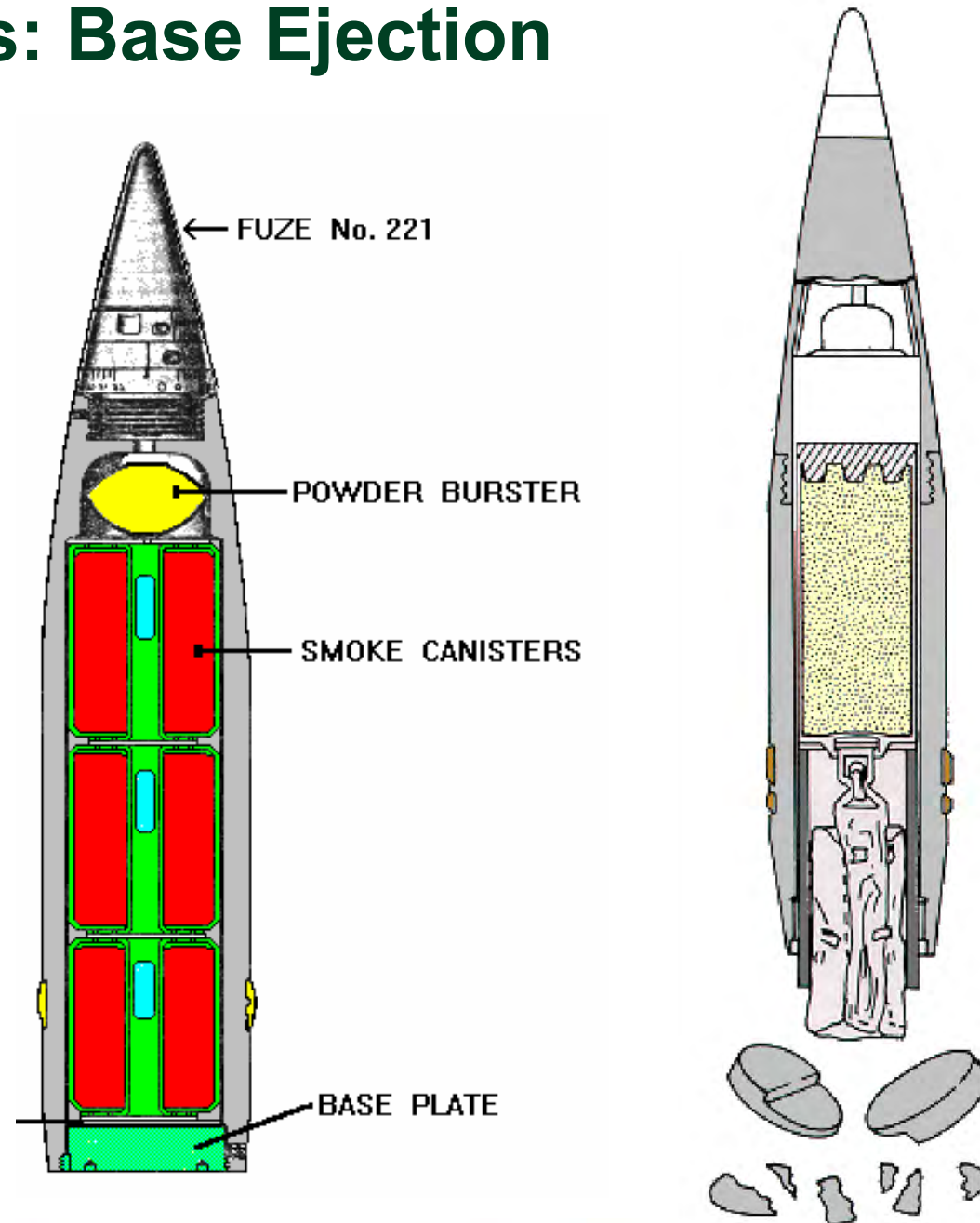
Additional Notes:

Sources:
Various news sources
Open source images

Carrier Projectiles: Base Ejection

Features:

- a) Ogival streamlined nose.
- b) Nose/Time fuzed.
- c) Parallel sides (on older items).
- d) Square or tapered base.
- e) One or two-piece body construction.
- f) Base plate held in place by weakened PVC ring or shear pins.
- g) Copper driving band may be fitted.
- h) Base plate ejected if the munition has functioned.
- i) Contains a small low explosive burster/expulsion charge.



Appendix 2.11

Generic Types of British / Allied Land Service Ammunition

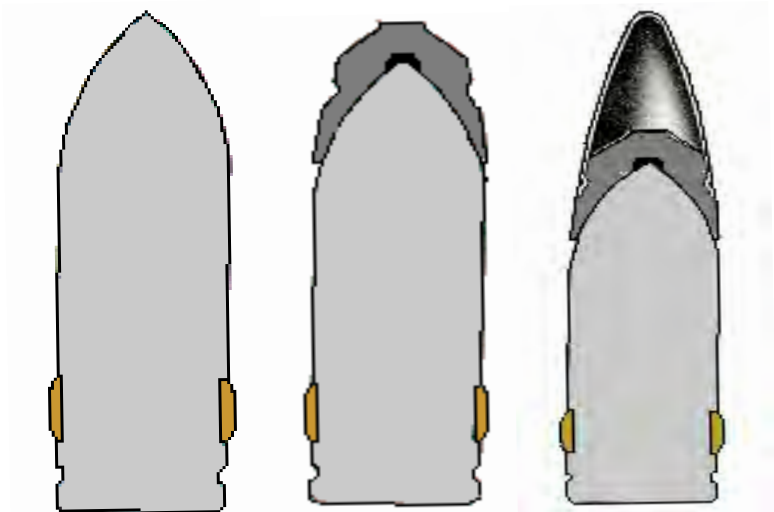
Additional Notes:

Sources:
Various news sources
Open source images

Shot Projectiles

Features:

- a) Driving bands (early designs) or obturators (current designs).
- b) Tracer pockets common.
- c) Ballistic caps and piercing caps (current designs).
- d) Early shot projectiles were made of hard high grade steel. Current designs use tungsten carbide or Depleted Uranium (DU) cores or penetrators.
- e) Most current shot projectiles now use discarding sabots, either of the post or petal type
- f) Proof shot projectiles have flat heads and are used to test guns.
- g) No fuzes are present.



Shot

AP Capped

AP Capped BC



4in Solid Shot

Appendix 2.12

Generic Types of British / Allied Land Service Ammunition

Additional Notes:

Sources:
Various news sources
Open source images



.303" Ammunition

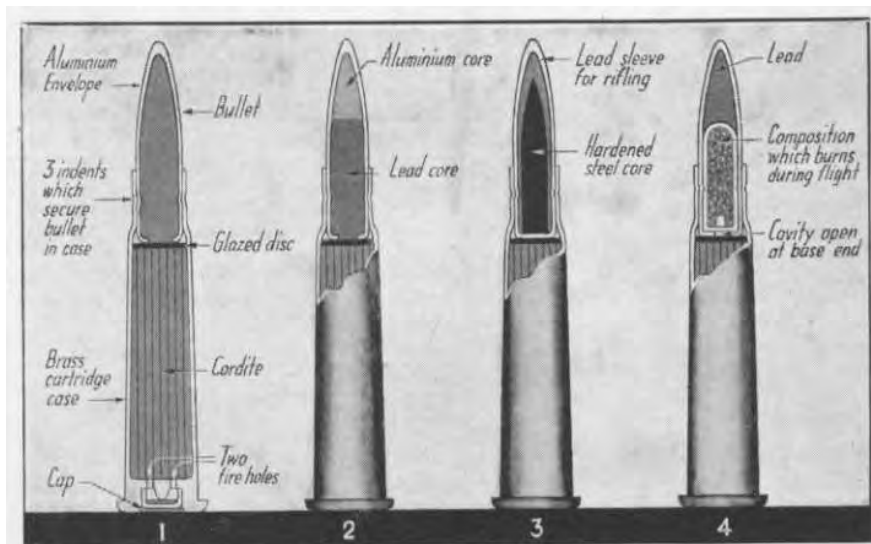


Fig. 1. Four types of ammunition used by modern infantry. 1 and 2 are ball cartridges, 3 is an armour-piercing bullet, and 4 a tracer bullet which burns and makes its flight visible.



Type: Rifle / machine gun round

Markings: Regular round – none. Tracer round – red primer

Bullet Weight: 150 – 180g

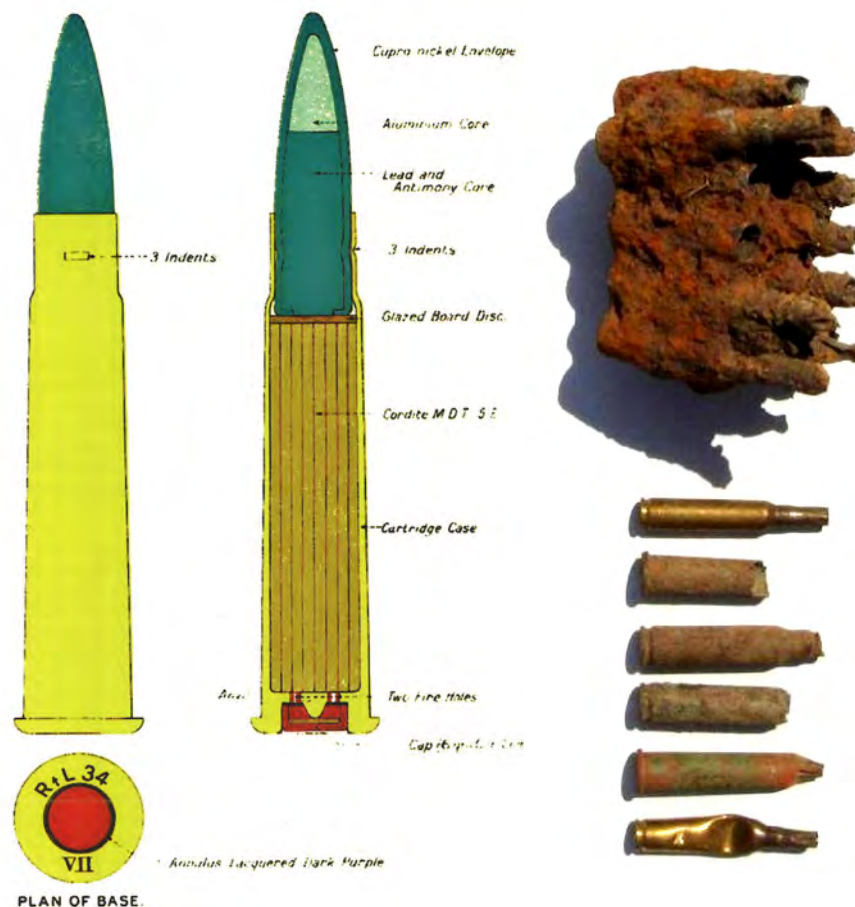
Dimensions: Total cartridge / projectile length – 182mm

Filling: Regular round – none. Tracer round – small incendiary fill

Threat: Explosive cordite within unspent cartridge

Deployment: Royal Navy, RAF and British Army Light Anti-Aircraft guns, machine guns and rifles. Standard British and Commonwealth military cartridge from 1889 until the end of the 1950s.

Remarks: Cartridges are belted or supplied loose in cartons



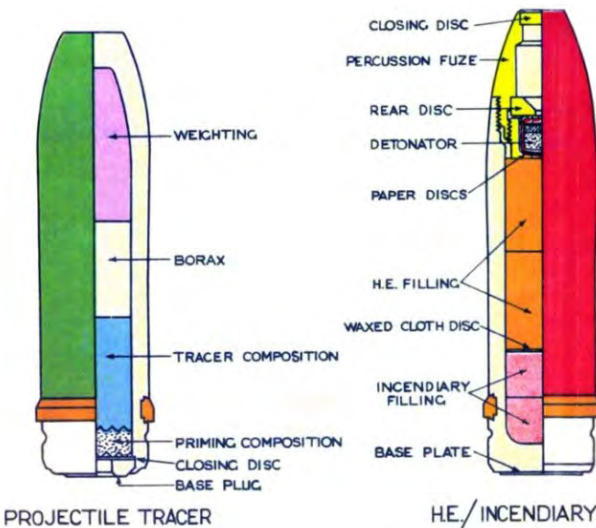
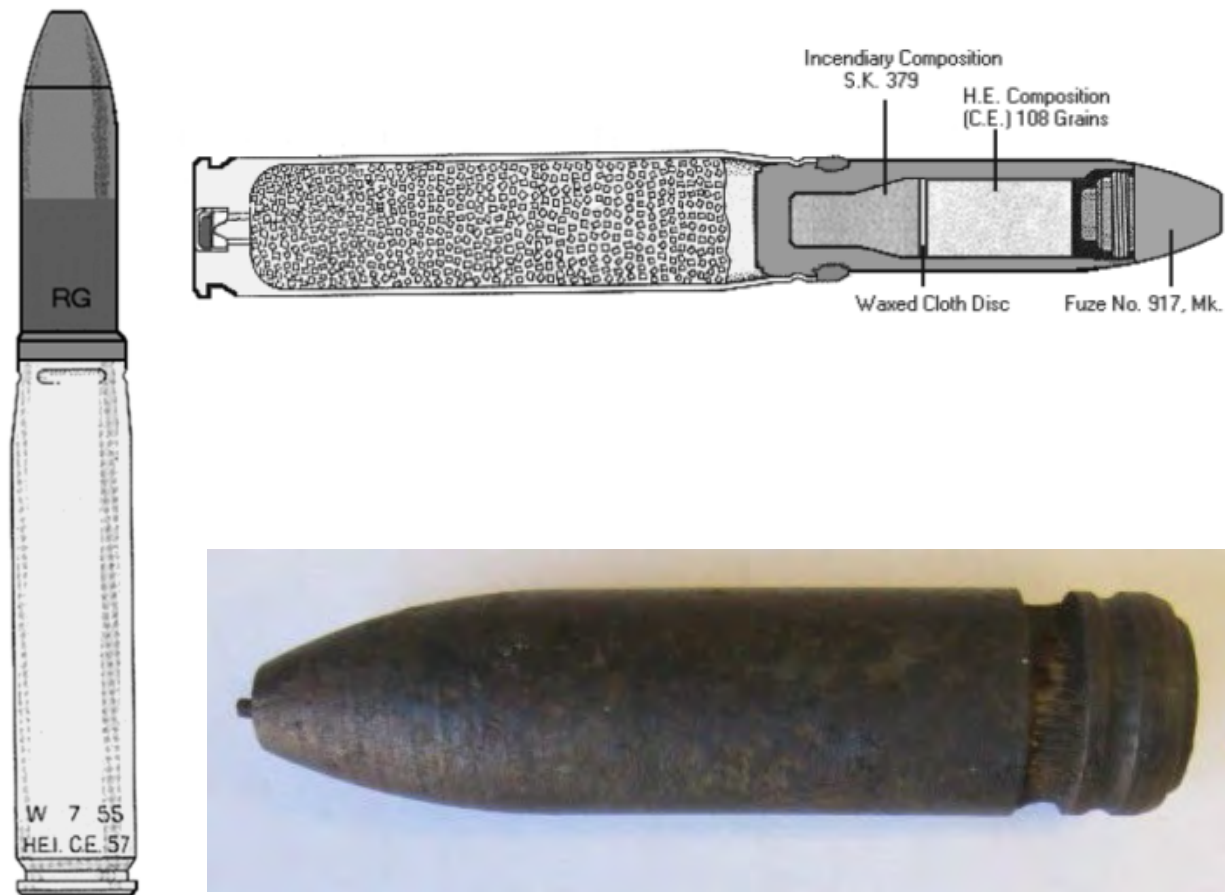
Appendix 2.13

Generic Types of British / Allied Small Arms Ammunition

Additional Notes:

Sources:
Various news sources
Open source images

200mm Hispano HEI Ammunition



COLOUR IDENTIFICATION		
BRITISH		
NATURE OF SHELL	H.E.FILLING	COLOUR
H.E. TRACER	T.N.T.	Blue
H.E.	T.N.T.	Orange
PROJ. PRACTICE		Pink
PROJ. TRACER		Green
H.E. INCENDIARY	T.N.T.	Red
H.E. INCENDIARY TRACER	T.N.T.	Light Green

Type: Live cannon round
Markings: Upper half of projectile painted “buff” colour, lower half is red
Cartridge Weight: 256g
Dimensions: Total cartridge / projectile length – 182mm
Fuze: Contact fuze – No. 253, No. 254 or No. 917
Filling: 108 grains of contact explosive & 68 grains of SR. 379 incendiary composition
Threat: Explosives within unspent cartridge as well as the projectile
Deployment: Royal Navy, RAF and British Army Light Anti-Aircraft guns, and RAF aircraft cannons.
Remarks: Cartridges are belted or supplied loose in cartons.

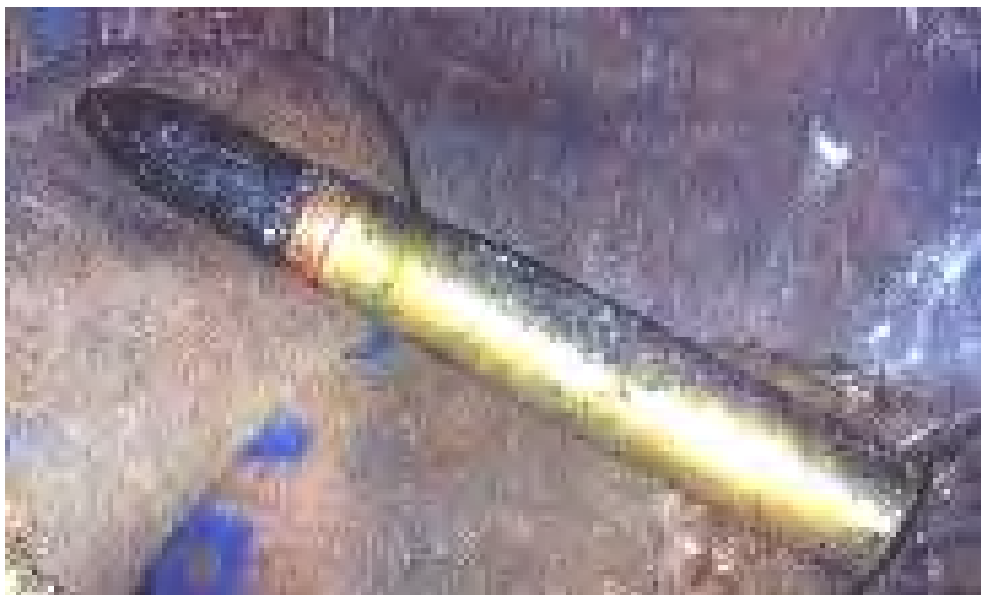
Appendix 2.14

Generic Types of British / Allied Small Arms Ammunition

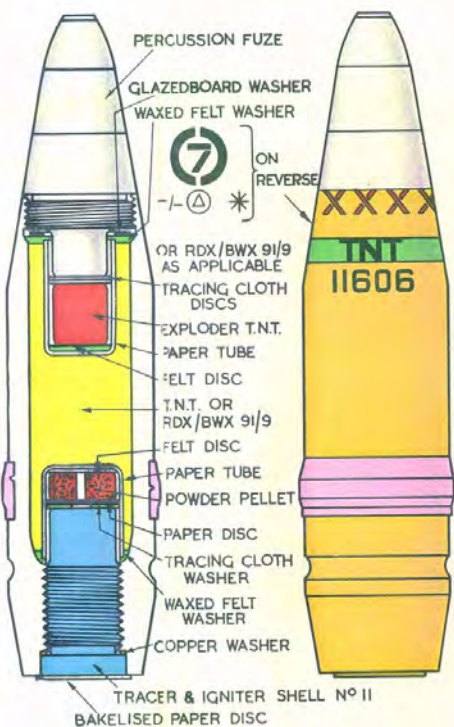
Additional Notes:

Sources:
Various news sources
Open source images

40mm Bofors Gun Projectile



SHELL, Q.F., HIGH EXPLOSIVE,
40 MM.



Weight: 0.86kg
Bomb

Dimensions:

40mm x 310mm

Rate of Fire: 120
rounds per min

Ceiling: 7,000m

Muzzle Velocity:
881m/s

Remarks: Mobile
batteries – normally
few records of
where these guns
were located

Appendix 2.15

Generic Types of British /
Allied Anti-Aircraft Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

3.7” Anti-Aircraft Projectile

Weight: 12.7kg (28lb)

Dimensions: 94 x 360mm (3.7 x 14.7in)

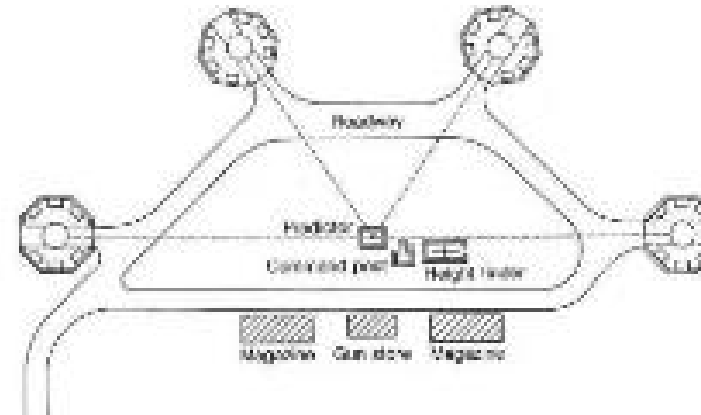
Carriage: Mobile and Static Versions

Rate of Fire: 10-20 rounds per minute

Ceiling: 9-18,000m (29-59,000ft)

Muzzle Velocity: 792m/s (2,598ft/s)

Remarks: 4.5 inch projectiles were also commonly utilised



Layout plan for a typical HAA battery site.



3.7 inch AA Projectile, Minus Fuze.



This AA shell was uncovered on a construction site in North London in February 2009.



Hyde Park 1939 3.7 Inch QF gun on mobile mounting.

Appendix 2.16

Generic Types of British / Allied Anti-Aircraft Ordnance

Additional Notes:

Sources:
Various news sources
Open source images

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