



Tangmere

Construction Environmental
Management Plan
(including CLP and AQDMP)

May 2026

Rev. B

1 Introduction

Site Details	
Development Name:	Tangmere
Landowner:	London Borough of Haringey
Site Address:	Broadwater Farm, Gloucester Road, Tottenham, London
Site Postcode:	N17 6H
Existing Site Use:	Former residential block now demolished.
Summary of works:	Erection of 17 townhouses and two apartment blocks comprising of 122 flats.
Hours of Operation:	Monday to Friday: 08:00 – 18:00 Saturday: 08:00 – 13:00 Sunday/Bank holidays: No work
Main Contractor Details	
Main Contractor	Formation Design & Build
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Document Control Sheet		Disclaimer
Report Reference	CS2895/T/CEMP/122025-PJC	This report is based on drawings, specifications, and information provided, supplemented by assumptions made by NRG to achieve compliance. NRG bears no responsibility to third parties for any use or interpretation of this report. Third parties act on the report's contents at their own risk. The use of this report is exclusively reserved for the named client only, unless accompanied by a signed letter of reliance.
Issue Purpose	For Planning Condition Discharge	
Report Prepared For	Formation Design and Build	
Revision	Revision B	

1.1 CEMP Objectives

NRG Consulting have been appointed to undertake a Construction Logistics and Management Plan (CLMP) for the proposed development at **Tangmere, Gloucester Road, Tottenham, London, N17 6HW**.

The scheme benefits from Planning Permission; Haringey ref: HGY/2022/0823 and the description of development is:

'Demolition of the existing buildings and structures and erection of new mixed-use buildings including residential (Use Class C3), commercial, business and service (Class E) and local community and learning (Class F) floorspace; energy centre (sui generis); together with landscaped public realm and amenity spaces; public realm and highways works; car-parking; cycle parking; refuse and recycling facilities; and other associated works. Site comprising: Tangmere and Northolt Blocks (including Stapleford North Wing): Energy Centre; Medical Centre: Enterprise Centre: and former Moselle school site, at Broadwater Farm Estate.'

The scheme has also had subsequent approved non-material amendments, ref: HGY/2025/1800, HGY/2025/1252 & HGY/2024/3514.

This report has been written to discharge **Planning Condition 23** which states:

The development hereby approved shall not commence until a Construction Environmental Management Plan (CEMP) has been submitted to and approved in writing by the Local Planning Authority. The CEMP shall include a Construction Logistics Plan (CLP) and Air Quality and Dust Management Plan (AQDMP), and the following information:

a) i. A construction method statement which identifies the stages and details how works will be undertaken; 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.

b) 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.

c) 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.

The development shall be carried out in accordance with the approved details as well as in accordance with the approved Air Quality Assessment and/or Air Quality Neutral reports, as appropriate.

Scope

This report is solely for the Tangmere element of the consented Broadwater Farm Estate redevelopment. The Tangmere plot comprises the demolition of the former Tangmere block and the construction of seventeen townhouses and 137 apartments delivered within Blocks A (North-West) and B (South-East), as illustrated in Figure 1.1.

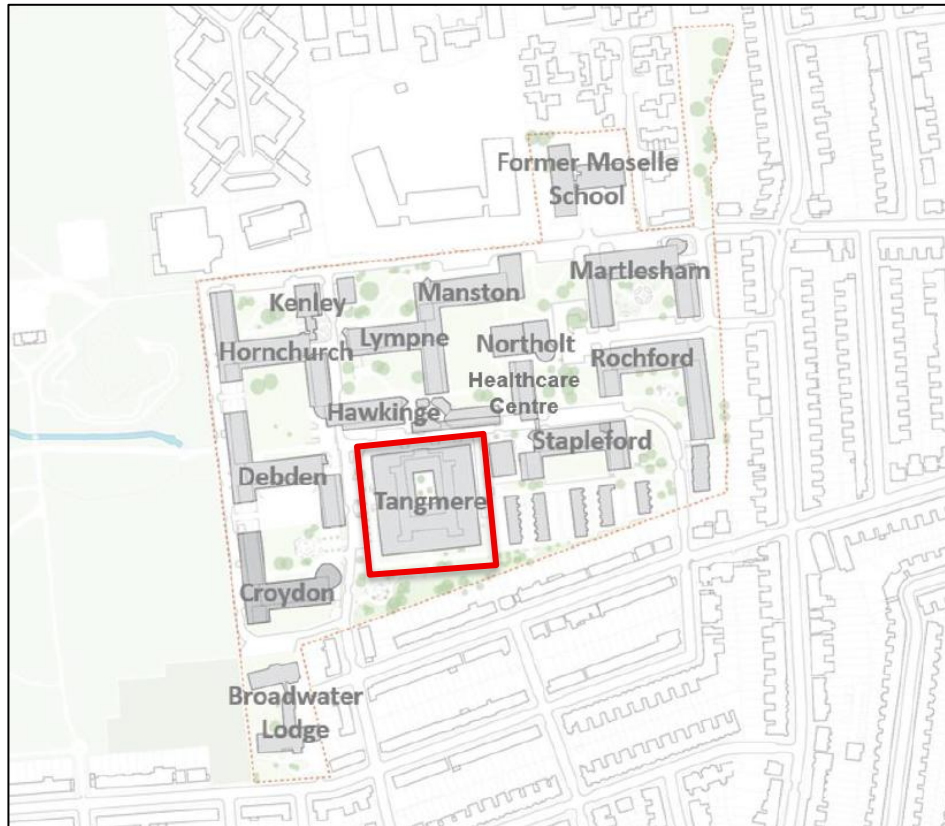


Figure 1.1: Broadwater Farm – Tangmere.

This report is written in line with TFL and CLOC's approved CLP template as accessed here:

https://www.clocs.org.uk/page/construction_logistics

The objectives of this CEMP are tailored to support the efficient and safe delivery of the construction works while minimising disruption to surrounding residents, the operation of Broadwater Farm Estate, and the wider public highway. The plan establishes a coordinated logistics framework that aligns with both local authority and TfL requirements, as well as the particular constraints of the estate environment.

Key objectives include:

- Ensuring safe and efficient access to the site for construction vehicles.
- Reducing congestion and avoiding conflict at key estate access points, including Gloucester Road, Willan Road and Adams Road, and ensuring that Seven Sisters Road and Lordship Lane remain unobstructed by construction activity.
- Maintaining pedestrian safety and uninterrupted access across estate footways, play areas and local desire lines.
- Ensuring compliance with traffic regulations, TfL requirements, and Broadwater Farm estate management protocols.
- Promoting sustainable construction practices in line with the CLOCS standard.

These objectives have been developed to reflect the specific constraints and sensitivities of the scheme and surroundings.

1.2 Site Context

The Tangmere site is located within the Broadwater Farm Estate, Tottenham (N17 6HW), accessed principally from Gloucester Road to the south and Willan Road to the north. The site previously accommodated the Tangmere block, which was partially demolished prior to the Main Contractor being appointed. These works are outside the scope of this report. The remainder of the site is to be cleared and forms part of the scope of works.

The site benefits from moderate public transport accessibility. Although not located adjacent to a rail or Underground station, several services are accessible within walking distance. South Tottenham Station is approximately ten minutes to the east, while Seven Sisters Underground and Overground stations are located further north. Existing bus services operate along Lordship Lane and West Green Road, providing regular connections to the wider network.

The site is not within a conservation area, and no statutory or locally listed buildings lie immediately adjacent to the Tangmere plot. The site lies within estate-managed parking zones overseen by Homes for Haringey.



Figure 1.2: Site Boundary

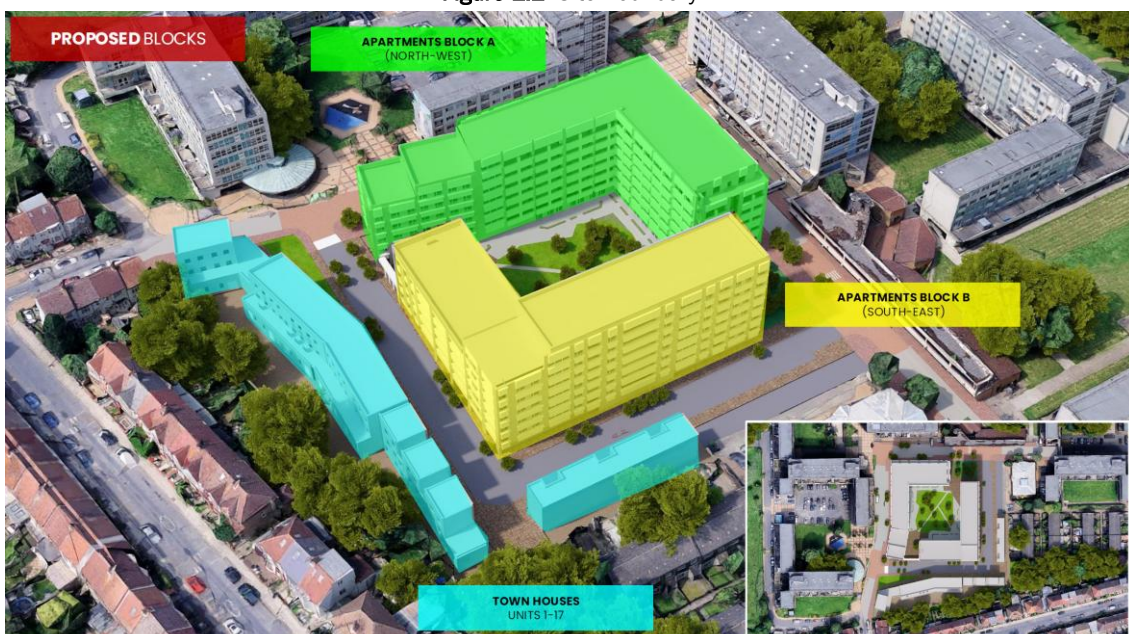


Figure 1.3: Proposed Blocks

1.3 Development Proposal

Residential Development

The Tangmere development comprises the construction of seventeen new townhouses fronting Gloucester Road and Adams Road, together with two new residential apartment buildings, referred to in this CLMP as Block A (North-West) and Block B (South-East).

Ancillary Works

The development includes a new central courtyard framed by the L-shaped arrangement of the apartment blocks, with landscaped communal areas, access galleries, play space and planting.

Public Realm and Highway Works

Public realm improvements will extend along Gloucester Road and Willan Road, including footway surfacing, tree planting and incorporation of S278 works, which are phased in line with the construction programme. A new road will also be constructed.

1.4 Response to Local Planning Authority Comments

This revised Construction Environmental Management Plan (including CLP and AQDMP) has been updated following comments received from the London Borough of Haringey in relation to the initial submission under Condition 23. The revisions seek to provide additional clarification regarding delivery management, pedestrian and cyclist safety, inclusive access arrangements, logistics controls and environmental mitigation measures. Table 1.1 below summarises the key comments raised by the Local Planning Authority and identifies where each matter has been addressed within this revised report.

LPA Comment	NRG Response
Clarification required regarding management of early, late and unexpected deliveries.	Additional detail regarding delivery scheduling, temporary holding arrangements and rebooking procedures has been included within Sections 3.1, 4.1 and 4.2.
Clarification required regarding operation of the delivery booking system.	Additional information regarding the live delivery register, marshal coordination and vehicle call-forward procedure has been included within Sections 4.1 and 4.2.
Clarification required regarding inclusive pedestrian access and temporary diversion routes.	Additional detail regarding accessible pedestrian routing, existing approved footway arrangements, barrier systems and marshal controls has been included within Sections 4.1 and 5.10.
Clarification required regarding wheel wash inspection frequency.	Additional maintenance and inspection procedures have been included within Section 4.5.
Summary of abnormal loads requested.	Additional commentary and summary information regarding abnormal loads has been included within Section 4.6.
Green/reverse logistics measures requested.	Additional sustainability and reverse logistics measures have been included within Sections 5.1 and 12.
Clarification required regarding out-of-hours deliveries.	Additional clarification confirming no routine out-of-hours deliveries are proposed has been included within Section 5.2.
Clarification required regarding hoarding adjacent to pedestrian routes.	Additional details regarding inward-opening gates, pedestrian widths and accessibility arrangements have been included within Section 5.10.
Additional consideration required for cyclists and cycle parking.	Additional mitigation measures relating to cyclists, vulnerable road users and local cycle infrastructure have been included within Sections 7 and 13.4.
Stronger commitment requested regarding school peak avoidance.	Revised delivery restrictions and school peak avoidance commitments have been included within Sections 2.4 and 7.3.
Clarification requested regarding waste compactors and reverse logistics.	Additional waste management and reverse logistics commentary has been included within Section 12.
Table 1.1: Response to Local Planning Authority Comments	

1.5 Report Structure

CONTENTS

1	Introduction	2
2	CLP - Context, Considerations and Challenges.	8
3	CLP and CMS - Construction Programme and Methodology	17
4	CLP - Vehicle Routing and Access	23
5	CMS - Strategies to Reduce Impacts	30
6	Staff Travel Plan	37
7	CLP - Estimated Vehicle Movements	39
8	CMS - Sensitive Receptors	41
9	AQDMP - Control of Emissions – Dust, Dirt and Air	45
10	AQDMP - Dust Control Measures	50
11	CLP - Dust Monitoring – Scheme Proposals	52
12	CMS - Noise & Vibration Emissions Control Measures	55
13	CMS - Site Waste Management	58
14	CLP - Implementing, Monitoring and Updating	59

Appendix 1 – Indicative Construction Programme

Appendix 2 – Crane Layout, Operating Radii and Swept Path Drawing

Appendix 3 – UXO Survey

Appendix 4 – Plant Noise Matrix

Figure 1.1: Extent of Demolition

Figure 1.2: Site as of March 2025

Figure 1.3: CGI of view of the proposed development

Figure 2.1: Regional Plan (Scale 1:10,000)

Figure 2.2: Local Context Plan (Scale 1:2,500)

Figure 2.3: Site Boundary Plan (Scale 1:250) – as submitted for Planning Approval as 'Location Plan'

Figure 2.4: Parking Bay Suspensions (also included as Appendix 2)

Figure 2.5: Nearest bus routes (Routes in blue, stops in red)

Figure 2.6: Local Cycle Routes

Figure 2.7: Cycle Routes via <https://tfl.gov.uk/maps/cycle>

Figure 3.1: Construction Programme

Figure 4.1: Regional Routing – North

Figure 4.2: Regional Routing – South

Figure 4.3: Local Route – North

Figure 4.4: Local Route – South

Figure 4.5: Swept Path

Figure 4.6: Swept Path

Figure 7.1: Construction Vehicles – Monthly and Daily

Figure 7.2: Estimated Construction Vehicles – Monthly and Daily

Figure 7.3: Hourly Arrival Profile of Vehicles During Peak

2 CLP - Context, Considerations and Challenges.

2.1 Policy Context

National Planning Policy Framework (NPPF) – December 2024

The NPPF promotes sustainable transport across the UK, especially at the early stages of planning. Promoting safe road design, and the efficient and sustainable delivery of goods and supplies. Specifically, it makes reference to:

- The potential impacts of development on transport networks can be addressed;
- Opportunities from existing or proposed transport infrastructure, and changing transport technology are realised.
- Opportunities to promote walking, cycling and public transport use are identified and pursued;
- The environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account
- Identifying appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains;
- Patterns of movement, streets, parking and other transport considerations are integral to the design of schemes

The London Plan (March 2021)

The London Plan sets out the spatial development strategy for London and provides the London wide context within which individual Boroughs set their local planning policies. A key objective of the London Plan is to improve London's accessibility, which amongst other issues, includes tackling traffic congestion.

Policy T7 - Deliveries, Servicing and Construction

This states:

G) Development proposals should facilitate sustainable deliveries and servicing, including through the provision of adequate space for servicing, storage and deliveries off-street. 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.

10.7.4 - When planning freight movements, development proposals should demonstrate through Construction Logistics Plans and Delivery and Servicing Plans that all reasonable endeavours have been taken towards the use of nonroad vehicle modes. Where rail and water freight facilities are available, Transport for London's freight tools should be used when developing the site's freight strategy.

10.7.6 - 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.

10.7.8 - 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 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.

The Mayor's Transport Strategy (MTS) (2018)

The MTS looks to optimise and change the ways in which the people of London use transport, to ensure three key themes are met. These include promoting healthy streets and people, by encouraging greener travel options, such as walking, cycling, and public transport. As well as ensuring these modes of transport are easy to use and effective as travel options over distances for the people of London. And thirdly ensuring more people want to live and work in London.

TfL Vision Zero Action Plan

The main aim of the Vision Zero Action Plan is to eliminate all deaths and serious injuries on London's transport system. This action plan works alongside the Mayor's Transport Strategy to reduce road danger on the London road network. The goals of the Vision Zero Action Plan include:

- **Safe speeds:** Encouraging speeds appropriate to the streets of a busy and populated city through the [widespread introduction of new lower speed limits](#).
- **Safe streets:** Designing an environment that is forgiving of mistakes by transforming junctions, which see the majority of collisions, and ensuring safety is at the forefront of all design schemes.
- **Safe vehicles:** Reducing risk posed by the most dangerous vehicles by introducing a world-leading Bus Safety Standard across London's entire bus fleet and a new '[Direct Vision Standard](#)' for Heavy Goods Vehicles.
- **Safe behaviours:** Reducing the likelihood of road users making mistakes or behaving in a way that is risky for themselves and other people through targeted enforcement, marketing campaigns, [education programmes](#) and safety training for [cyclists](#), [motorcycle and moped riders](#).
- **Post-collision response:** Developing systematic information sharing and learning, along with improving justice and care for the victims of traffic incidents.

Traffic Management Act (2004)

Managing traffic networks within a council's borough is the prerogative of that council. The Traffic Management Act Part 2 sets this responsibility as the councils to ensure that measures are taken to assess impacts and capabilities of road networks within areas of the UK. This is done to avoid issues relating to congestion and managing the overall road network.

TfL Healthy Streets

The Healthy Streets indicators were designed to ensure Londoners experience streets that feel pleasant, safe, and attractive. 80% of Londoner's travel time is spent on London's street, including public transport and walking from tube/rail stations.

The Healthy Streets approach is to provide an idealised version of the model street, a long-term plan for improving Londoner's experiences. This is executed by using 10 evidence-based indicators on what makes streets attractive places. These indicators should be what a project is working towards.



2.2 Site Context – Three Plans at Different Scales

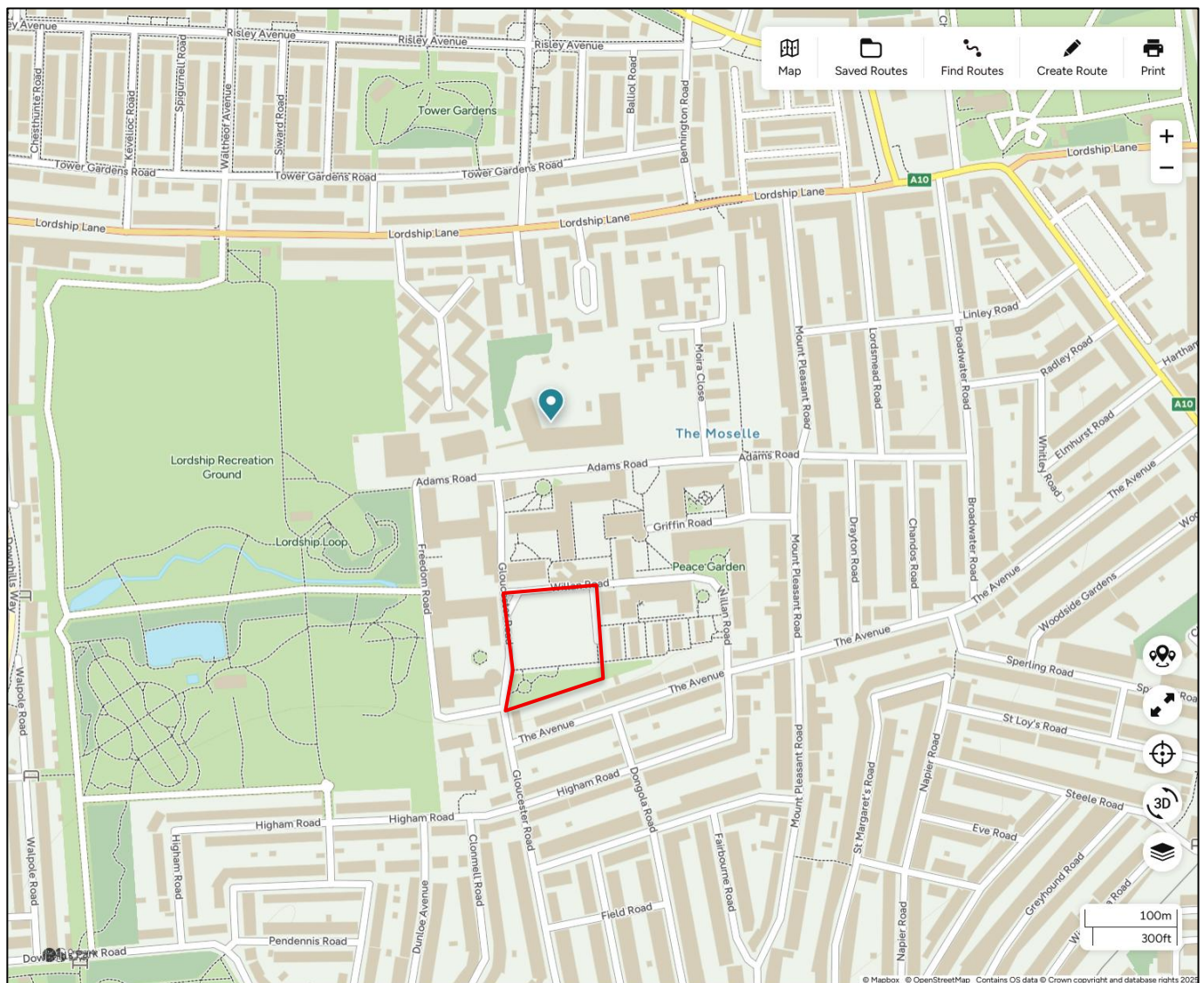


Figure 2.1: Regional Plan (Scale 1:10,000)

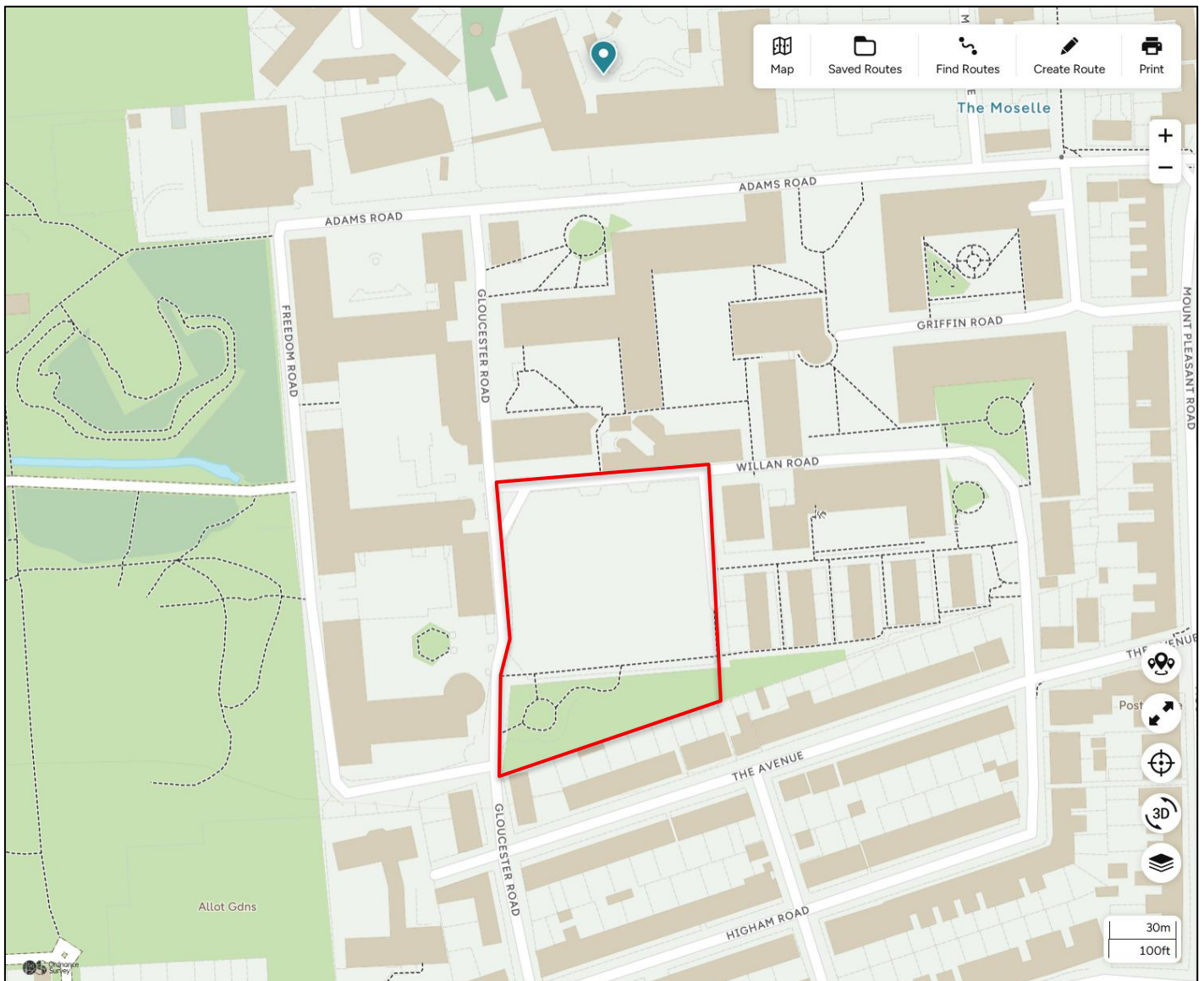


Figure 2.2: Local Context Plan (Scale 1:2,500)

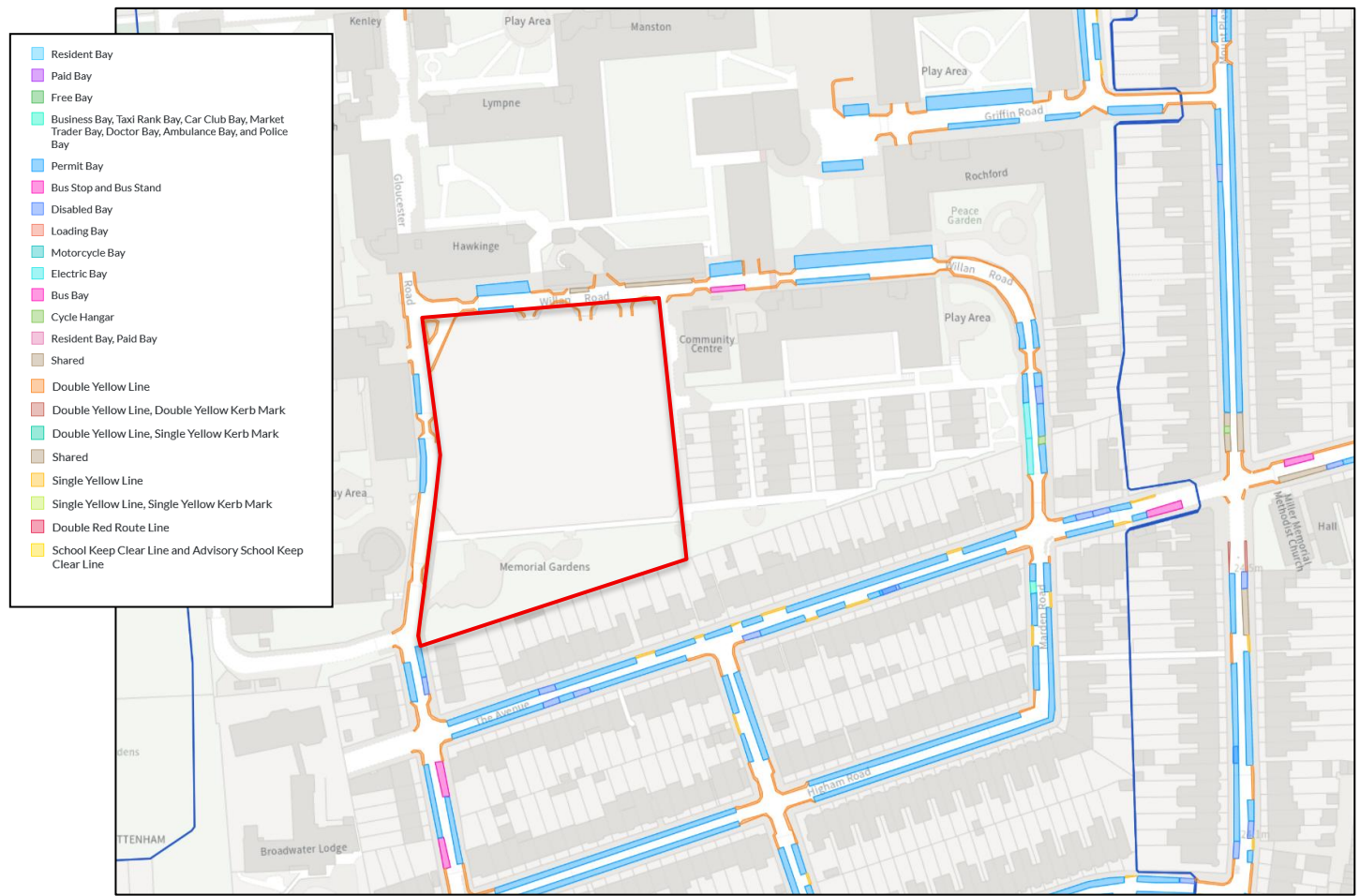


Figure 2.3: Site Boundary Plan - <https://streets.appyway.com/haringey>

2.3 Local Access Including Highway, Public Transport, Cycling, Walking and Waterways

Highways, Carriageways and Footways

The Tangmere site is located within the internal road network of Broadwater Farm Estate, with principal access taken from Gloucester Road and Willan Road, both of which are residential estate roads serving the surrounding dwellings. These streets are characterised by low traffic volumes, established pedestrian routes, and traffic-calming measures that prioritise pedestrian safety.

The wider area is served by Lordship Lane (A1055) to the south and Walpole Road to the west, both of which provide links to the strategic highway network. No road closures or suspension of public parking bays are currently anticipated as part of the construction works. All construction vehicle movements will be scheduled and managed to minimise congestion and ensure that the surrounding public highway remains fully operational at all times.

The local highway network is set out in Table 2.1 below.

Road Name	Classification	Speed Limit	Street Lighting	Restrictions
Gloucester Road	Local residential road	20 mph	Present	Primary site access route; pedestrian priority
Willan Road	Local residential road	20 mph	Present	Secondary access route; connects estate blocks
Adams Road	Local residential road	20 mph	Present	Residential street with playground and school access further east
Lordship Lane (A1055)	Principal A-road	30 mph	Present	Strategic east–west corridor; no construction activity proposed
Walpole Road	Local road	20 mph	Present	Connects to surrounding residential neighbourhood

Table 2.1: Local Highway Network

Gloucester Road

Gloucester Road forms the southern boundary of the Tangmere site and is a local residential street serving the Broadwater Farm Estate. It is a two-way carriageway with a 20 miles per hour speed limit and standard street lighting. The road includes footways on both sides and provides access to residential buildings and community facilities within the estate. Traffic volumes are generally low, although activity increases during school and community peak periods. Gloucester Road will accommodate controlled construction vehicle access and egress, with all movements managed to maintain safe and uninterrupted pedestrian routes.

Willan Road

Willan Road runs along the northern side of the Tangmere plot and provides an important movement corridor within Broadwater Farm. It is a two-way residential carriageway with a 20 miles per hour limit and is well-lit throughout. The road features generous footways and connects several estate blocks, community spaces, and play areas. Traffic levels are moderate and predominantly resident-led. Owing to its function as a pedestrian-focused street, any construction-related activity in its vicinity will be carefully managed to preserve safe passage for estate users.

Adams Road

Adams Road is located to the east of the Tangmere site and serves as a local residential road connecting various parts of the estate. It is a two-way carriageway with a 20 miles per hour speed limit and standard street lighting. The street supports footways on both sides and provides access to dwellings and estate amenities. The road experiences increased pedestrian activity at certain times of day due to the presence of nearby community and educational facilities. Construction logistics will therefore avoid any undue impact on these sensitive periods.

Lordship Lane (A1055)

Lordship Lane (A1055) lies to the south of Broadwater Farm and functions as a key east–west arterial route in this part of north London. It is a two-way principal road with a standard speed limit of 30 miles per hour, dedicated bus services, and signalised pedestrian crossings. The road is well-lit and carries high volumes of general traffic, including buses and commercial vehicles. It connects Wood Green and Tottenham Hale and forms part of the borough's strategic movement network. No construction access is proposed from Lordship Lane, and all construction activities will be managed to ensure no disruption to its operation.

Walpole Road

Walpole Road is situated west of the estate and functions as a local residential connector road. It is a two-way carriageway with a 20 miles per hour speed limit and standard street lighting. The road carries light traffic and is used primarily for local access, with on-street parking and footways on both sides. Pedestrian activity is steady throughout the day due to links with nearby residential areas and open spaces. Construction traffic will not use Walpole Road for access, ensuring that its residential character and circulation patterns are preserved.

Railway/Underground

Although the estate is not directly adjacent to a station, the site benefits from reasonable public transport accessibility.

- South Tottenham Station (London Overground) lies approximately ten minutes to the east on foot.
- Seven Sisters Station (Victoria line and Overground) is located further north.
- Both stations fall within Zone 3 and provide interchange with other London rail and bus services.

These connections support the use of public transport by construction personnel and site visitors.

Bus Routes

Broadwater Farm is served by multiple bus routes that operate along Lordship Lane, providing frequent services to Wood Green, Turnpike Lane, Tottenham Hale, Edmonton and central London. Bus stops are located within short walking distance of the site.

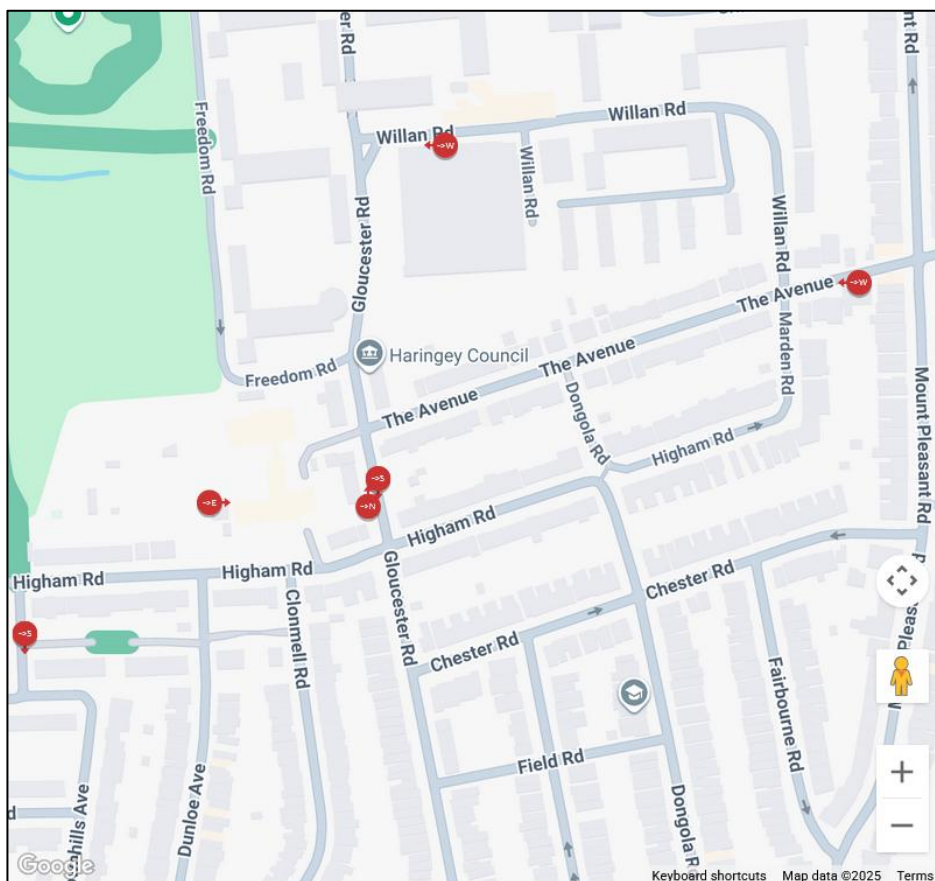


Figure 2.5: Nearest bus routes (<https://tfl.gov.uk/maps/>)

Bus Stop Code	Location	Bus Routes	Notes
W	Gloucester Road	W4	Closest stop to Tangmere; northbound and southbound services
→W / →E	Mount Pleasant Road	W4	Provides estate-level access; used by residents and visitors
LH / LD	Mount Pleasant Road	123, 243	Links estate to Wood Green, Tottenham, and central London
LC / LJ	Awlfield Avenue	123, 243	Short walk from Willan Road; key east-west services
LB / LK	Waltheof Avenue	123, 243	Major stops on the A1055 corridor near the estate
RT / RS	All Hallows Road	318	Connects to Tottenham Hale and Northumberland Park
RR / RU	Awlfield Avenue	318	Secondary stops providing orbital east-west access
RB	Lordship Lane	123, 217, 231, 444, 617	High-frequency corridor; major interchange point
RA / RN	Granville Road	144, 217, 231, 444, 617	Connections to Wood Green, Enfield, and Turnpike Lane
F / Q	Mount Pleasant Road	230, 341	Connects to Turnpike Lane, Stratford, and Angel Road
K / P	Bruce Grove Station	123, 243, W4	Rail interchange; supports construction workforce travel
Y / S	Enfield & Haringey Magistrates Court	318	Regular eastbound and westbound services
NE / B	Tottenham High Road / Bruce Grove	149, 259, 279, 341, 349, 476	Major high-capacity corridor; frequent services 24/7
W	Willan Road	W4	Provides estate-level access; used by residents and visitors
Table 2.2: Local Bus Network			

Further timetable details and journey planning tools can be obtained from www.tfl.gov.uk/buses.

The proposed development will not impact any bus stops or bus routes.

Walking and Cycling

The estate benefits from a well-established pedestrian network, with continuous footways along Gloucester Road, Willan Road, and Adams Road. These routes provide key connections between the site, adjacent residential blocks, the community centre, and open spaces. The Design and Access Statement illustrates how pedestrian movement across the estate forms an integral part of daily activity.

During construction, pedestrian access around the site perimeter will be maintained at all times. Clear wayfinding, appropriate lighting, and safe segregation from construction activities will be provided.

The area includes a network of quiet residential cycle routes, providing connections to the wider neighbourhood and linking to Cycleway 1 to the east. Secure cycle parking facilities are located nearby and will be signposted for use by construction staff where appropriate. Cycling will be encouraged for staff travel to reduce reliance on motorised transport.

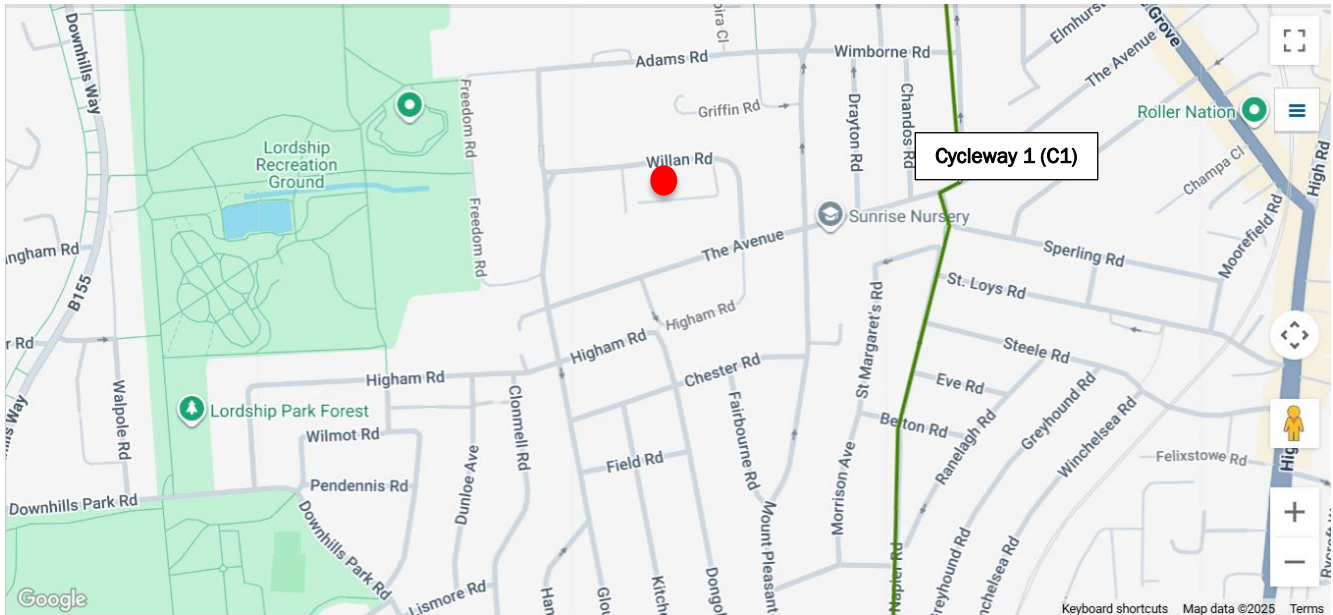


Figure 2.7: Cycle Routes (<https://tfl.gov.uk/maps/cycle>)

Waterways

There are no waterways or navigable water routes in proximity to the site. The scheme does not require consideration of canal or river transport logistics.

2.4 Community Considerations

Construction and demolition works will be to the following hours:

- Monday to Friday: 08:00 – 18:00
- Saturday: 08:00 – 13:00
- Sunday/Bank holidays: No work

These hours apply to all plant and machinery, deliveries, and vehicle movements. The principal contractor will ensure that all subcontractors, suppliers, and delivery drivers adhere to these restrictions.

Broadwater Farm is a densely populated estate, and the community will remain active throughout the construction period. It is therefore essential that construction activities are planned and managed with sensitivity.

Residential Properties

The Tangmere plot is immediately surrounded by residential buildings on Gloucester Road, Willan Road, and The Avenue, including the existing blocks of Rochford, Stapleford, and Lypne. Residents use the estate footpaths extensively throughout the day, including for trips to nearby amenities and open spaces. Construction vehicle movements will avoid the busiest times of residential activity, typically 08:00–09:30 and 16:30–18:00.

Local Schools

A primary school is located to the east of the estate, generating significant pedestrian activity during the morning and afternoon school periods. For this reason:

- Construction vehicle movements will be avoided between 08:00–09:30 and 15:00–16:30 wherever possible.
- All construction-related traffic entering or leaving the estate will be supervised by trained traffic marshals.
- Additional temporary signage will be installed to reinforce awareness of children and other vulnerable road users.

3 CLP and CMS - Construction Programme and Methodology

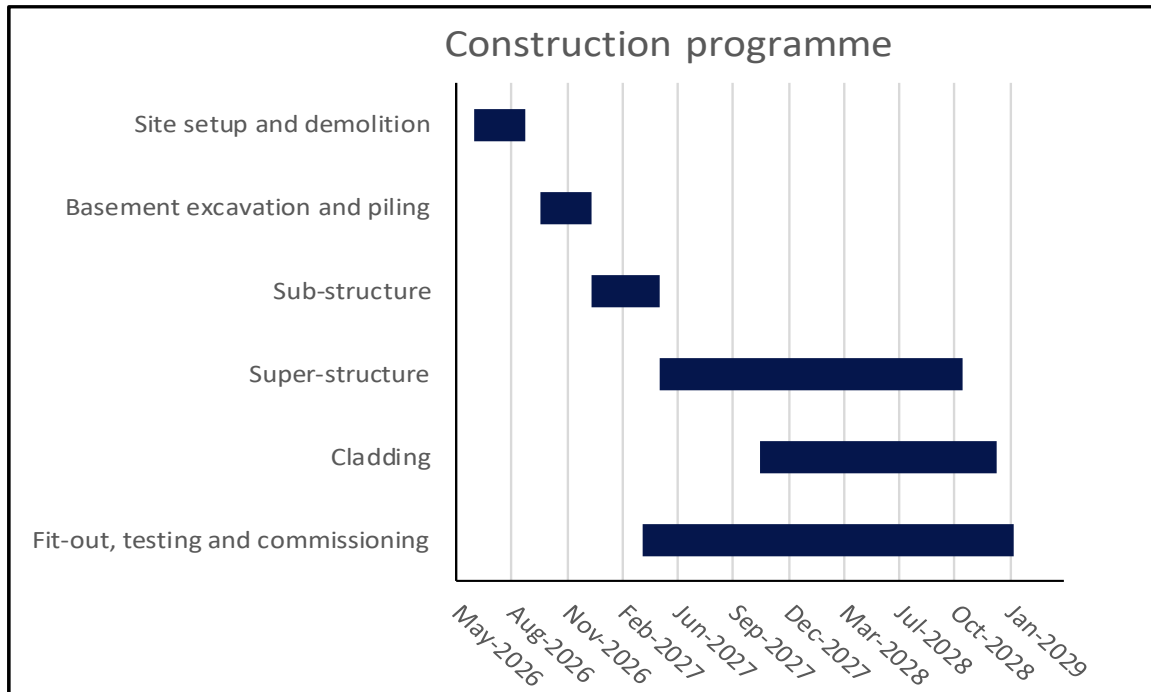


Figure 3.1: Construction Programme

Construction phase	Start	End
Site setup and demolition	Jun-2026	Sep-2026
Basement excavation and piling	Oct-2026	Jan-2027
Sub-structure	Jan-2027	May-2027
Super-structure	May-2027	Nov-2028
Cladding	Nov-2027	Jan-2029
Fit-out, testing and commissioning	Apr-2027	Feb-2029

Table 3.1: Construction Programme

3.1 Construction Programme Phases

The works will be delivered in a carefully sequenced programme to construct seventeen townhouses and two apartment buildings (Blocks A and B), with associated drainage, utilities, external works and landscaping. Each phase has been designed to minimise disruption to the surrounding community, protect pedestrian safety and maintain safe operation of the estate road network. All activities will be undertaken in accordance with the Construction (Design and Management) Regulations 2015, current HSE guidance and recognised best practice.

The largest vehicle expected during any stage is an articulated lorry. All deliveries will be pre-booked in advance through a live delivery schedule maintained by the Site Manager. Delivery slots will be coordinated to avoid peak periods and prevent vehicle stacking on surrounding estate roads.

Vehicles arriving early will be held within the temporary holding area located along the haul road between Adams Road and Willan Road until called forward by the Site Manager or Traffic Marshal. Late or unexpected deliveries will be reviewed against ongoing operations, site capacity and safety constraints and, where necessary, rejected or rebooked.

All deliveries will be overseen by trained banksmen and traffic marshals to ensure safe movements within the site and along the temporary haul route.

Site Setup and Demolition

Initial works will include the installation of hoarding and welfare facilities and the formation of the primary site access points on Gloucester Road and Willan Road. Temporary fencing, signage, pedestrian diversion routes and service connections will be implemented in accordance with the approved methodology. Clearance of remaining hardstanding and vegetation will then take place, together with preparation of working areas within the site.

A limited element of residual demolition remains on site and will be undertaken following confirmation of permanent disconnection of the former substation by the London Borough of Haringey.

Key Considerations

The estate roads surrounding the site are narrow and heavily used by pedestrians throughout the day. There is no on-street waiting or holding capacity for construction vehicles. All deliveries must therefore arrive on a strict booking system to avoid congestion outside the hoarding line.

Pedestrian routes adjacent to Gloucester Road must remain open during setup, requiring phased hoarding installation and controlled plant movements.

Key materials: Hoarding panels, fencing, welfare cabins, temporary utilities, signage, skips

Largest vehicle: Rigid lorry (7.1 metres).

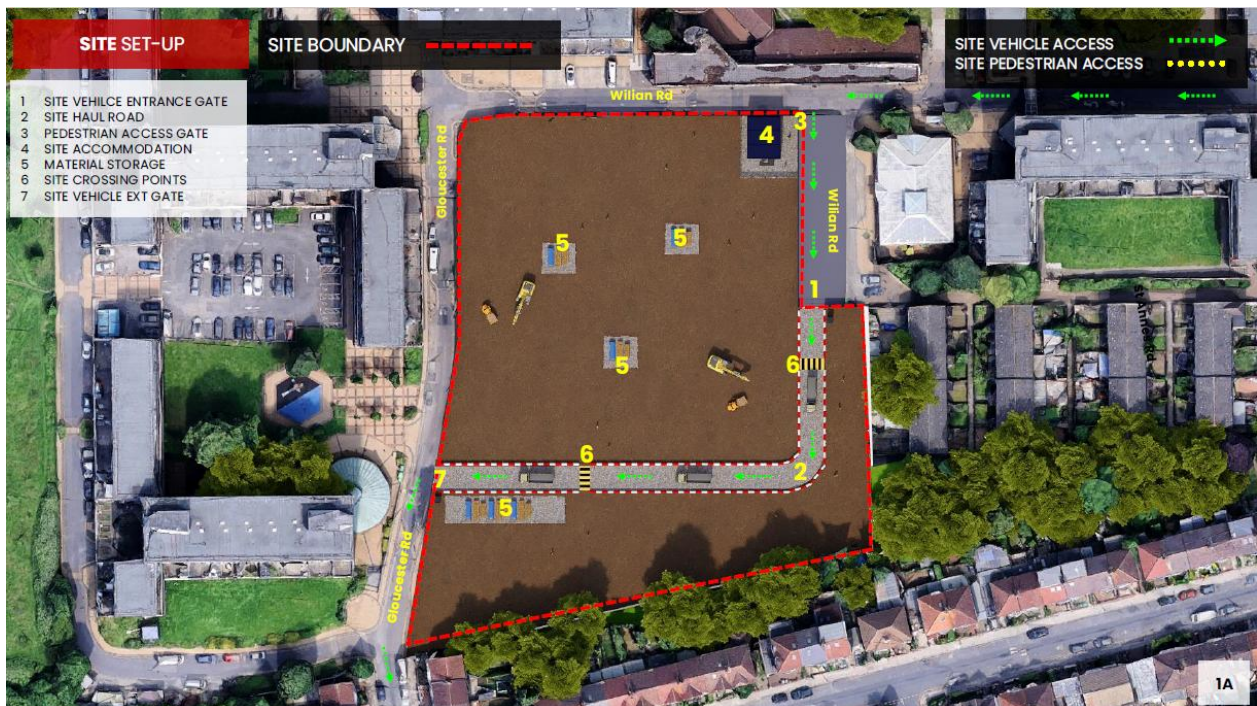


Figure 3.2: Site Setup

Basement Excavation and Piling

There is no basement within the Tangmere scheme, but excavation will be required for crane bases, foundation pads and drainage corridors.

Piling will be undertaken for Blocks A and B and the townhouses. Spoil will be removed regularly using tipper lorries, supported by wheel-washing and dust suppression systems.

Key Considerations

Vehicle turning space within the estate is extremely limited, making spoil removal sensitive to peak pedestrian hours. Articulated vehicles cannot be used for excavation export due to restricted road geometries; only rigid tippers can be accommodated. Noise and vibration management is essential due to occupied residential properties immediately adjoining the eastern, western and northern boundaries.

Key materials: Reinforced steel, formwork, concrete, waterproofing membranes, excavation plant.

Largest vehicle: Rigid tipper lorry (7.1 metres).

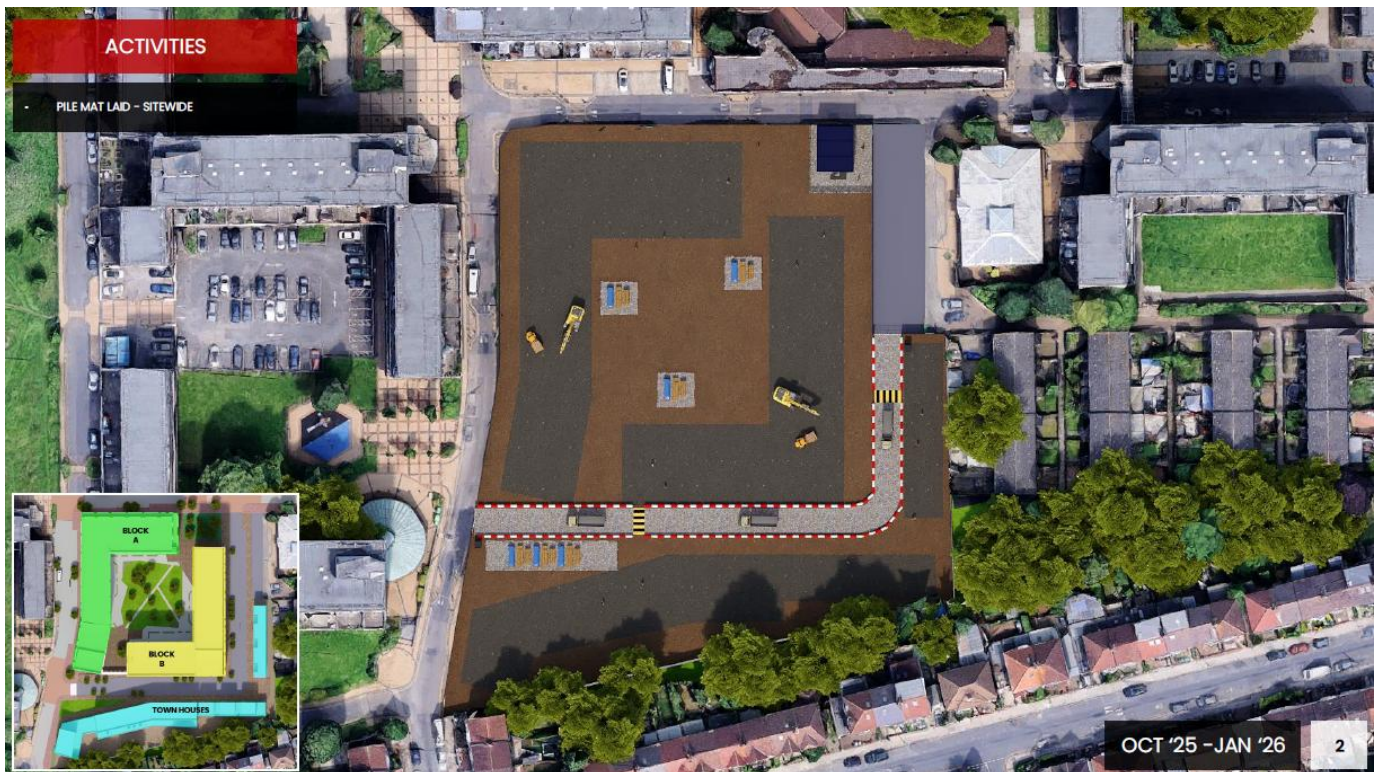


Figure 3.3: Pile Mat Layout

Sub-Structure

Sub-structure works include reinforced concrete foundations, ground beams, utility trenches and ground-floor slabs for the townhouses and apartment blocks. Drainage and service ducts (LTHW, BCWS, sprinklers, telecoms) will be installed as per the construction stage (Stage 4) drawings.

Key Considerations

There is limited space for bulk material storage. Concrete deliveries must therefore follow a highly disciplined schedule, with pump positions fixed to avoid obstruction of footways. Deep service trenches cross narrow working areas, requiring traffic segregation and tight coordination to ensure safe pedestrian access along Gloucester Road and Willan Road.

Key materials: Concrete, reinforcement steel, drainage pipes, insulation boards.

Largest vehicle: Concrete delivery lorry (7.8 metres).

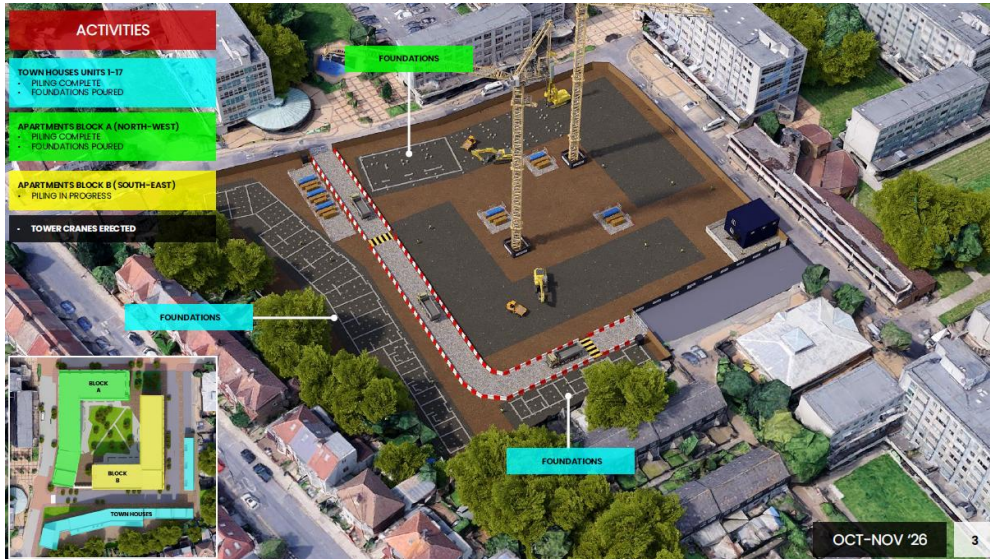


Figure 3.4: Sub-Structure

Super-Structure

The super-structure phase includes construction of townhouse frames followed by the floor-by-floor reinforced concrete frame of Blocks A and B. Two luffing tower cranes will support this phase, providing vertical access for concrete skip lifts, precast components and rebar.

Key Considerations

This phase generates the highest volume of large-vehicle deliveries, including articulated lorries. Estate roads cannot accommodate simultaneous arrival of multiple articls. Deliveries must therefore be staggered, with marshals positioned at both access points to prevent queuing. Crane swing areas must not oversail public routes, requiring defined exclusion zones and timed lifting windows to safeguard residents and pedestrians.

Key materials: Concrete frame components, reinforcement steel, blockwork, precast façade units, bricks

Largest vehicle: Articulated Lorry (16.2m length)



Figure 3.5: Super-Structure

Cladding

The cladding phase includes installation of brickwork, glazing, balconies, precast concrete elements and roofing.

Key Considerations

Large façade elements require just-in-time delivery due to limited on-site storage.

Key materials: Cladding panels, brickwork, glazing systems, roofing membranes, PV panels

Largest vehicle: Articulated Lorry (16.2m length)



Figure 3.6: Cladding

Fit-out, Testing and Commissioning

Internal works will include M&E installation, plastering, joinery, finishes, kitchen and bathroom fit-out, followed by building testing, commissioning and certification. External works—including paving, boundary treatments and landscaping—will run alongside fit-out towards the later phases of the programme.

Key Considerations

Although the volume of deliveries reduces during fit-out, estate congestion remains a risk due to the live residential environment. Access must be kept clear for emergency vehicles at all times. Noise management is critical during internal fit-out due to the proximity of occupied buildings. Landscaping and public realm works must be sequenced carefully to maintain safe pedestrian circulation..

Key materials: M&E components, plasterboard, insulation, joinery, sanitaryware, floor finishes, paving, plants and topsoil.

Largest vehicle: Box lorry (7.1 metres).

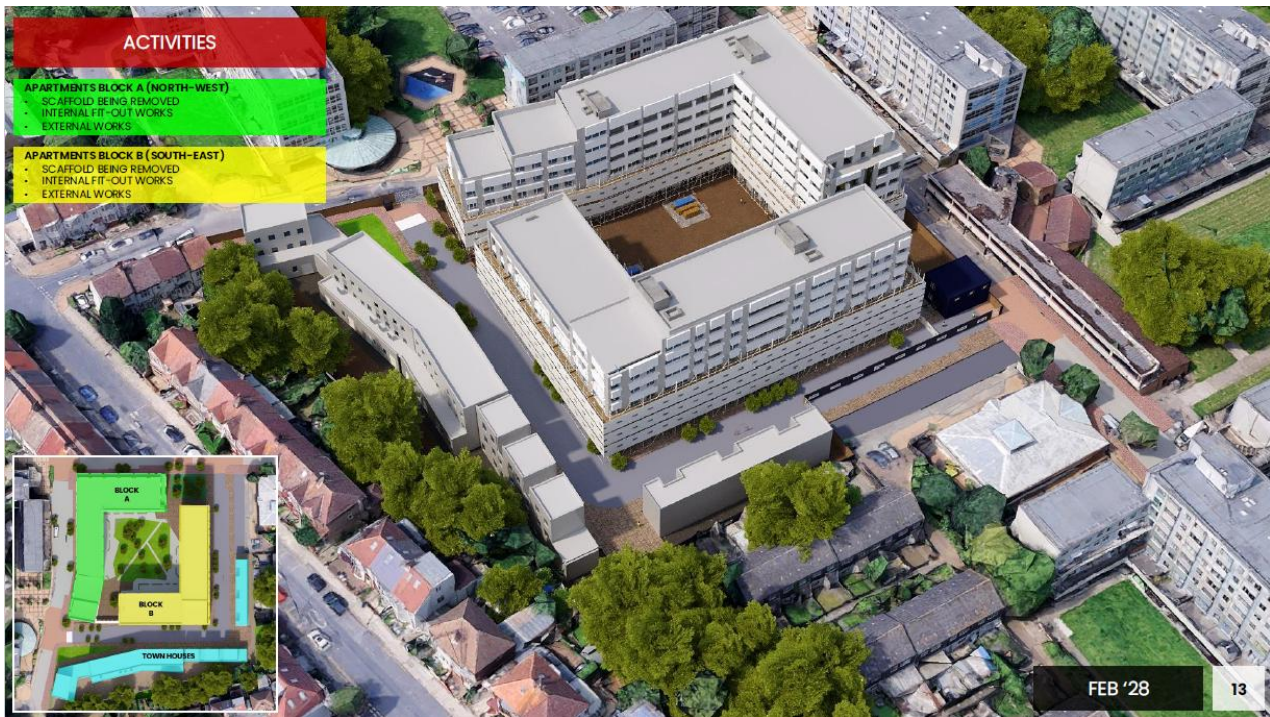


Figure 3.7: Fit-out, Testing and Commissioning

S278 Highway and External Works (Apr 2028 – Dec 2028)

These works include estate footway improvements, road surface treatments, kerb realignment, pedestrian route enhancements, soft landscaping, street furniture installation and final tie-ins between the new development and the existing estate network.

Phasing follows the contractor's S278 sequencing:

Phase 1: Apr–Jun 2028

Phase 2: Jun–Aug 2028

Phase 3: Aug–Oct 2028

Final external works: Oct–Nov 2028

All works here will be completed by the end of 2028.

Key Considerations

These works occur directly on estate circulation routes and therefore require carefully controlled temporary traffic management. Pedestrian diversions must be maintained at all times. Deliveries must avoid peak movement periods due to shared highway conditions. Surface works will be phased to prevent isolating residents from their homes and to maintain continuous emergency access.

Key materials: paving, kerbs, resin bound surfaces, street furniture, tree pits, planting

Largest vehicle: rigid lorry (approx. 7.1 m)

4 CLP - Vehicle Routing and Access

No car parking will be provided on-site. Construction operatives will be encouraged to travel by sustainable modes including walking, cycling and public transport, in line with CLOCS and TfL guidance. All construction-related vehicles will follow defined routing arrangements to minimise disruption to residents of Broadwater Farm Estate, protect pedestrian movement and prevent congestion on the surrounding highway network.

The construction vehicle routing plans are shown in Figures 4.1 and 4.2 and will be issued to all contractors and subcontractors responsible for vehicle movements to and from the site.

Regional Routes

All construction vehicles approaching from the north, north-west, or M25 corridor will follow the route below:

Follow M25 and The Ridgeway (A1005) to Old Park Avenue in Enfield

- Take Old Park Ridings to Green Dragon Lane
- Continue via Firs Lane and the A10 southbound
- Turn onto Mount Pleasant Road in Tottenham
- Continue to Adams Road
- Mount the new temporary haul road
- Arrive at Willan Road, London N17 6NA (site entrance)

This route avoids constrained inner-London corridors and provides the most direct connection to the site via the A10, which is capable of supporting heavy vehicle movements.

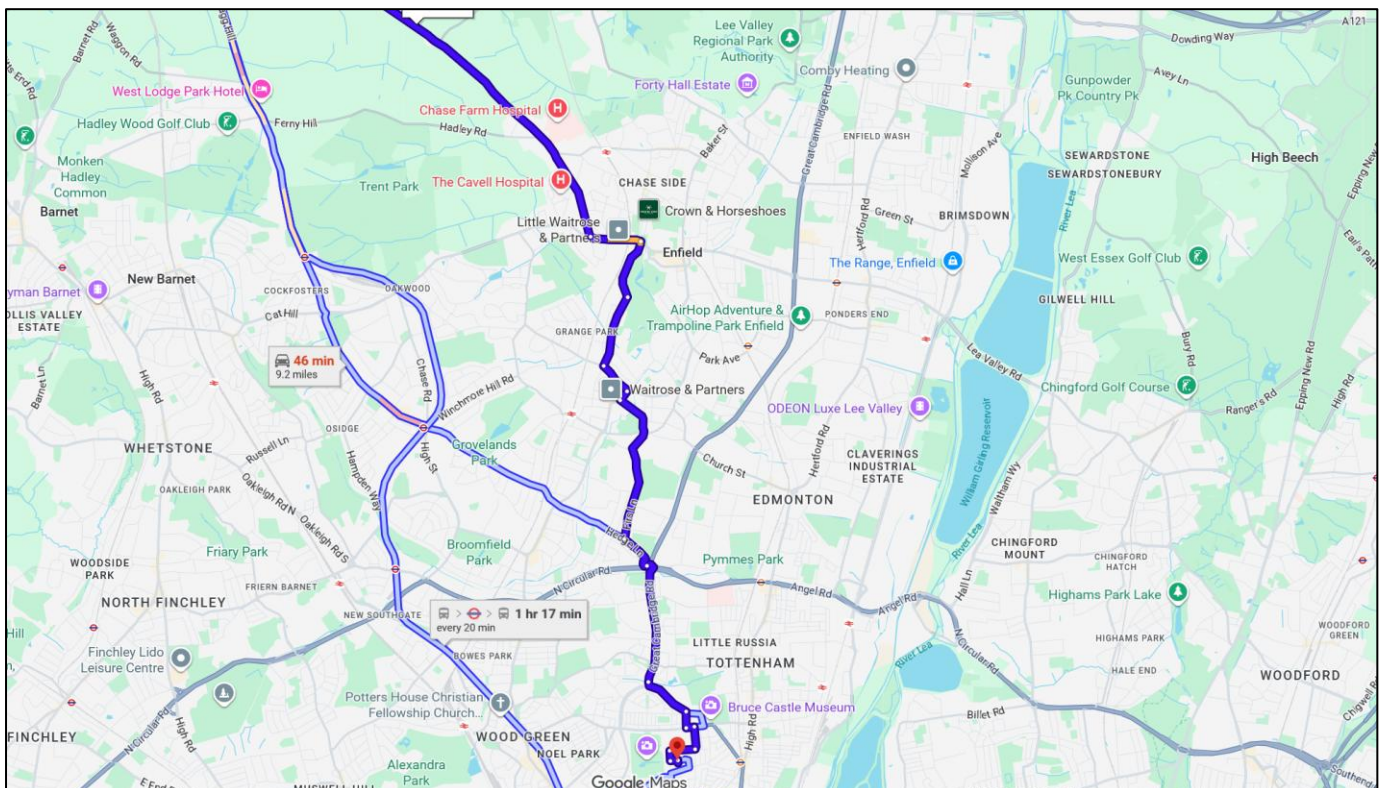


Figure 4.1 Regional Routing – North

Local Routes

Local construction traffic will be routed via the principal estate-access roads, avoiding narrow residential streets elsewhere on the estate. The approved local access route is:

- Lordship Lane
- Adams Road
- Temporary haul road (constructed for the Tangmere works)
- Willan Road
- Tangmere site entrance on Gloucester Road

The temporary haul road between Adams Road and Willan Road has been introduced specifically for construction access to prevent vehicles from circulating through the main residential loops of Broadwater Farm.

Vehicles will enter and exit the site via Gloucester Road with turning provided on-site.



Figure 4.2 Local Route

A temporary haul road and controlled holding area will operate between Adams Road and Willan Road to facilitate the safe management of construction traffic entering the site. The haul road measures approximately 107 metres in length and will operate as a managed call-forward area controlled by Traffic Marshals positioned at both the haul road and site entrance. Vehicles will only proceed to the site once confirmation has been received that sufficient space is available internally.

This arrangement removes the need for vehicles to wait on surrounding estate roads and forms a key part of the delivery management strategy throughout the construction programme.

Temporary Haul Road and Vehicle Holding Area

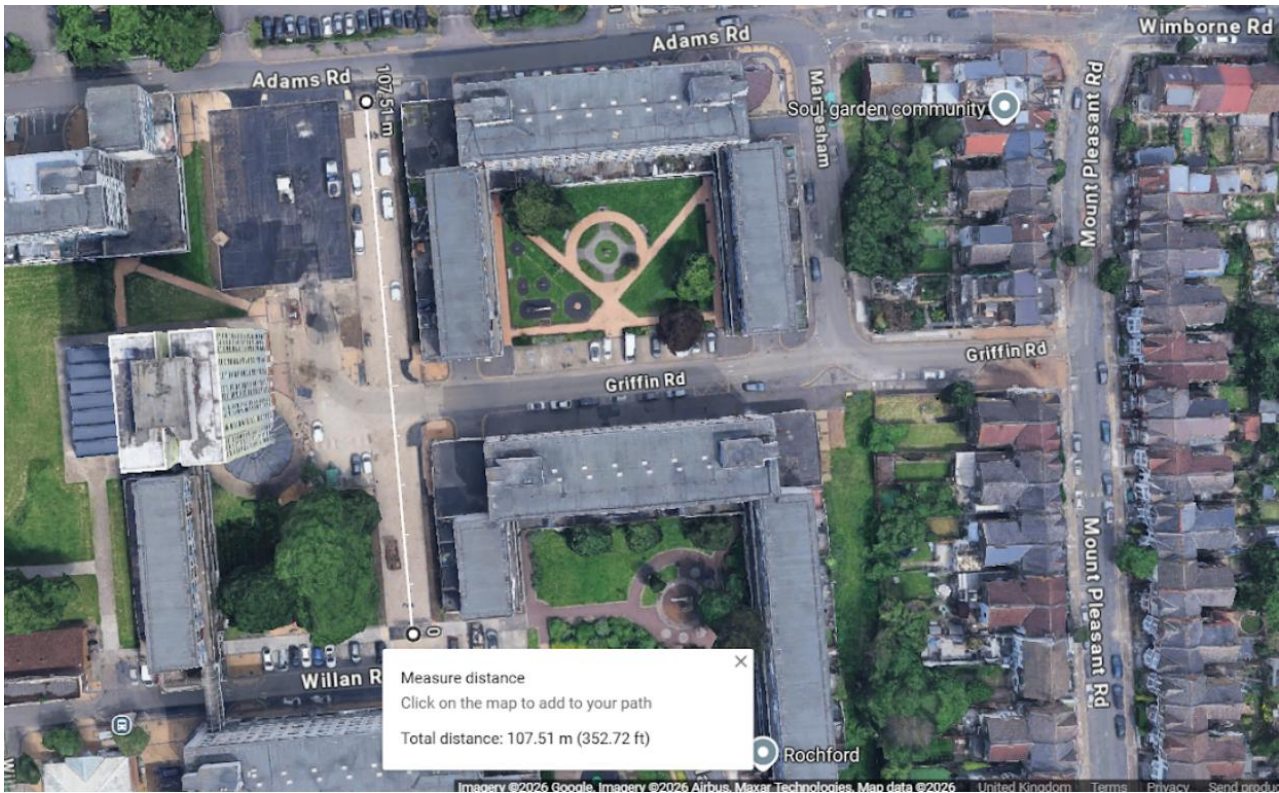


Figure 4.3 Temporary Haul Road and Vehicle Holding Area

4.1 Site Access

Site access arrangements have been designed to provide safe and efficient separation of pedestrians, residents, construction personnel and construction traffic.

Two independent access points will be maintained throughout the works:

Construction Vehicle Gate - Willan Road

All delivery vehicles will enter the site from Willan Road, after travelling along the temporary haul road from Adams Road. Gate operations will be managed by a banksman-led gatehouse and coordinated through a live delivery booking register maintained by the Site Manager. The booking system records delivery slots, supplier details, vehicle types, material types and arrival/departure times.

Vehicles arriving early will be temporarily held within the designated haul road holding area until called forward by the site team. Vehicles arriving late or outside agreed booking slots will be reviewed against current site activities and may be rejected or rebooked if safe access cannot be maintained.

Vehicles will leave the site in forward gear via Gloucester Road, eliminating the need to reverse onto the public highway.

Pedestrian and Workforce Access

A designated pedestrian access point will be provided on the perimeter of the site. Site personnel will enter via a biometric turnstile, ensuring that only inducted and authorised individuals access the work area. No on-street parking will be permitted; workers will be required to travel by public transport or walk in.

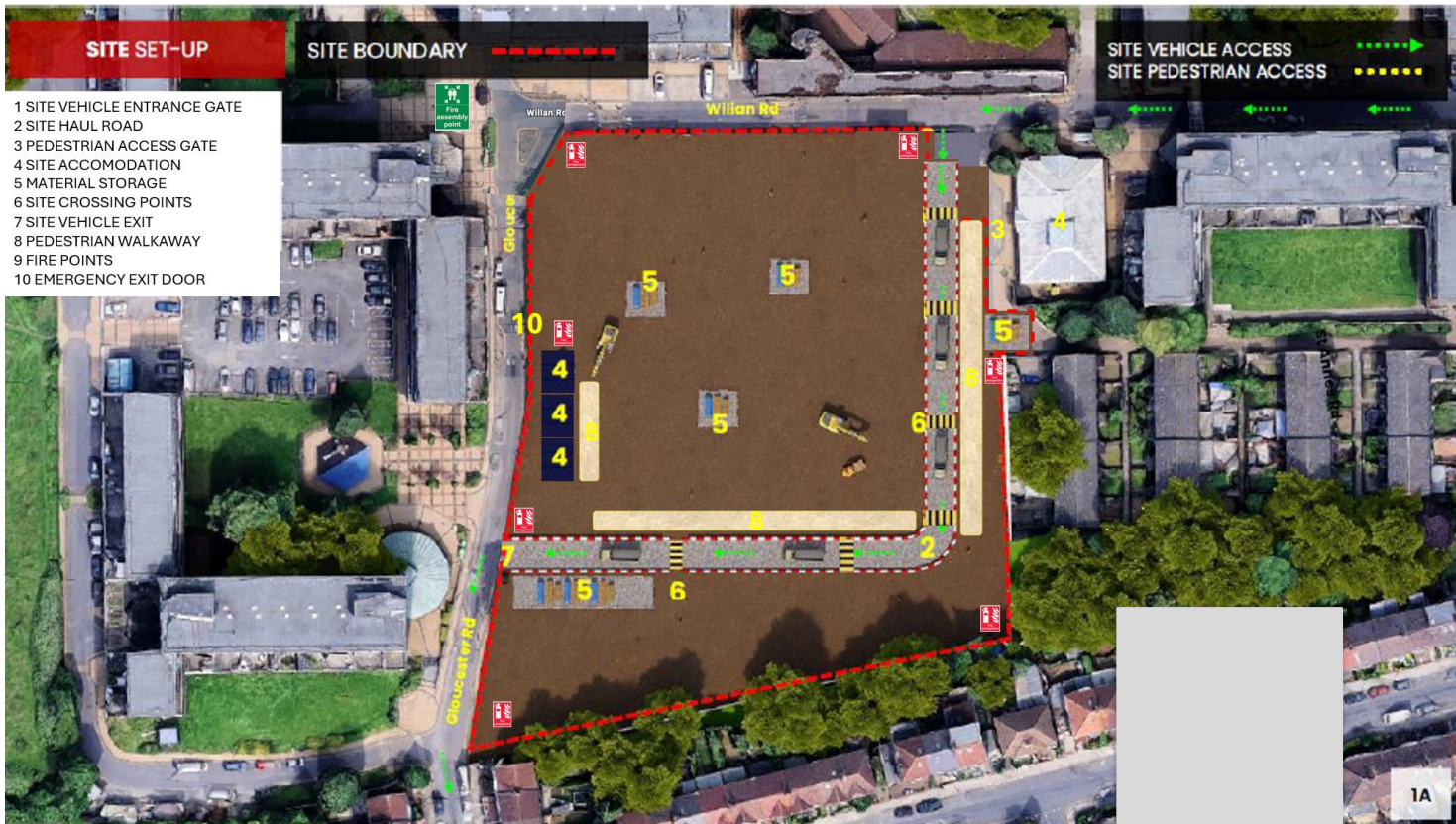


Figure 4.4 Site Access Points

Pedestrian and Resident Access

Existing approved pedestrian management arrangements surrounding the site will remain in operation throughout the works unless otherwise agreed with the Highway Authority. Where temporary pedestrian diversions are required, routes will be clearly signed, barriered, adequately illuminated and maintained as step-free where reasonably practicable to accommodate wheelchair users, mobility impaired persons and those with buggies.

All pedestrian routes will be inspected daily by site management and any defects, obstructions or safety concerns rectified immediately.

Traffic Marshals

A qualified traffic marshal will be present for all deliveries. The traffic marshal will:

- Ensure vehicle drivers are aware of nearby pedestrians, cyclists, and other road users.
- Guide vehicles safely as they exit the site, covering blind spots and assisting the driver to reduce risks.
- Alert nearby pedestrians and cyclists to the vehicle's movement, ensuring the vehicle can leave the site safely.

Banksmen

Within the site, qualified banksmen will be deployed to manage vehicle movements, particularly when reversing or manoeuvring near structures and personnel. The banksmen will:

- Direct vehicles and machinery to ensure safe and precise movements, particularly in restricted areas.
- Assist drivers in navigating confined spaces, reducing the risk of collision with structures, equipment, or site personnel.

4.2 Delivery Management and Booking System

A delivery management system will be implemented to ensure that all vehicle movements are controlled, safe, coordinated and predictable. The system will prevent congestion on estate roads, protect pedestrians, avoid peak local activity periods and support compliance with CLOCS requirements.

Booking System

All deliveries will operate under a digital delivery management and booking system. The system will:

- Allocate defined delivery slots for each vehicle.
- Prevent overlapping vehicle arrivals.
- Ensure that vehicles only enter the estate when the route is clear.
- Monitor delivery performance and attendance.
- Log all vehicle types, driver details and arrival times.
- Track compliance with safety requirements, including FORS and CLOCS standards.

No construction vehicle will be permitted to arrive at Willan Road or Adams Road without a confirmed booking. In the event of simultaneous, early or unexpected deliveries, vehicles will either be temporarily held within the managed haul road holding area or instructed to leave and return at a revised delivery slot, depending on site capacity and ongoing operations at that time.

The system will also cover:

- Concrete pour timings.
- Crane lift coordination.
- Cladding and façade deliveries (due to just-in-time requirements).
- M&E plant deliveries and large internal fit-out packages.
- S278 works deliveries during late-stage external works (Apr–Nov 2028).

CONTRACTOR	DESCRIPTION	DATE	VEHICLE	GATE	TIME
KONFORM	Dumper	07.04.26	Rigid Lorry	Main	11:00
KONFORM	Roller	07.04.26	Rigid Lorry	Main	11:20
KONFORM	8T Excavator	07.04.26	Rigid Lorry	Main	11:40
KONFORM	25 Muck Away	08.04.26	Tipper	Main	9:30/15:00
KONFORM	25 Muck Away	09.04.26	Tipper	Main	9:30/15:00
KONFORM	25 Muck Away	10.04.26	Tipper	Main	9:30/15:00
EMBASSY DEMOLITION	1 Bin Exchange	08.04.26	Rigid Lorry	Main	10:30
EMBASSY DEMOLITION	1 Bin Collection	08.04.26	Rigid Lorry	Main	11:30
EMBASSY DEMOLITION	15 Concrete Away	08.04.26	Tipper	Main	9:30/15:00
EMBASSY DEMOLITION	15 Concrete Away	09.04.26	Tipper	Main	9:30/15:00
EMBASSY DEMOLITION	15 Concrete Away	10.04.26	Tipper	Main	9:30/15:00
EMBASSY DEMOLITION	1 Bin Exchange	10.04.26	Rigid Lorry	Main	12:00
EMBASSY DEMOLITION	Diesel	10.04.26	Rigid Lorry	Main	13:00

IMPORTANT NOTICE

No Delivery unless agreed and planned with FDB in advance.
 All deliveries to be offloaded INSIDE the site and site always secured.
 2x Traffic Marshall need to be in place for the Haul Road. 1 always with radios to communicate for assistance as deliveries arrive. Each trade contractor delivery shall provide a competent person to attend their respective offload. Make sure deliveries come through the Haul Road.
 Delivery Restriction applies from 8:00 to 9:30 15:00 to 16:30.

Figure 4.5 Delivery Booking Register for the Tangmere Site

4.3 Site Set Up

Site set-up will be delivered in a phased manner to align with the evolving requirements of the Tangmere construction programme. During the initial enabling works, a temporary welfare unit will be installed to provide office and welfare space. As the project progresses into the main construction phase, this will be replaced with a larger, fully serviced accommodation compound suitable for the Formation Design & Build Ltd (FDBL) management team and subcontractors. The welfare compound will be located within the site boundary.

The site layout reflects the access strategy whereby all construction vehicles enter from Willan Road and exit via Gloucester Road, ensuring one-way circulation throughout the site. Welfare areas will be positioned away from the internal haul route to avoid vehicle-pedestrian conflict, and will remain accessible from the designated pedestrian gate. Materials laydown zones will be arranged adjacent to the tower crane swing areas.

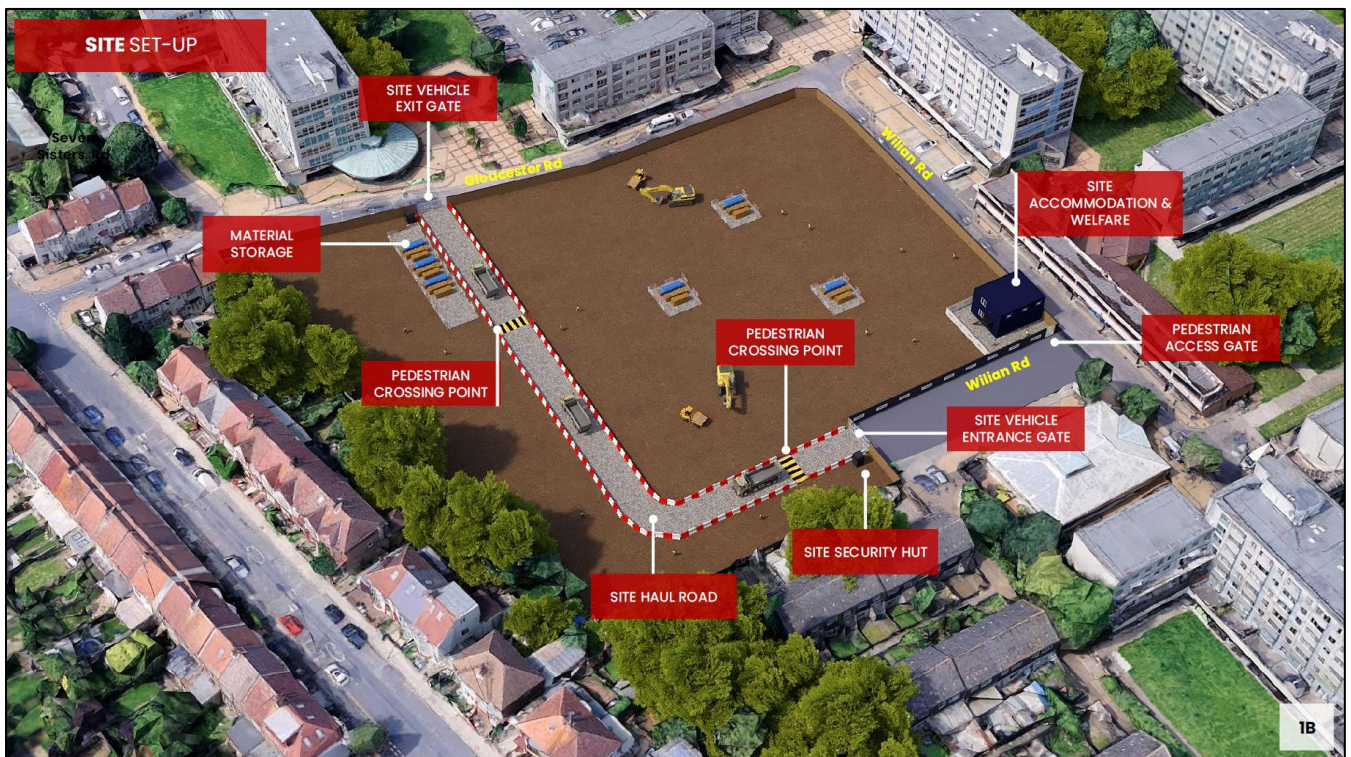


Figure 4.5: Site Layout

Welfare facilities will include offices, toilets, canteen, meeting room, drying room, and first aid station. All welfare units will meet current HSE guidance standards, be adequately heated and lit, and include seating for a minimum of 15 people in the meeting room. Facilities will be cleaned, inspected, and maintained daily, with appropriate waste storage, collection, and disposal processes in place.

4.4 Crane Operations and Lifting Strategy

Tangmere will utilise tower cranes to support the construction of the superstructure, façade installation and major material lifts. Crane operations have been carefully planned to minimise impacts on the surrounding Broadwater Farm Estate and to integrate safely with the site access and delivery strategy.

The proposed crane locations, operating radii and exclusion zones are illustrated in Appendix 2 – Crane Layout and Swept Path Drawing. Crane selection and positioning have been designed to:

- Service both Blocks A and B efficiently without the need for mobile crane oversailing of estate roads;
- Minimise crane oversail beyond the site boundary wherever practicable;

- Avoid oversailing of neighbouring residential buildings and public footways;
- Align lifting operations with the constrained site layout and one-way vehicle circulation strategy.

All crane bases will be constructed within the site boundary and designed in accordance with the approved methodology. Crane erection and dismantling will be undertaken during pre-agreed time windows.

During lifting operations:

- Temporary exclusion zones will be established within the site (if needed);
- Banksmen and lifting supervisors will be present at all times;
- Crane movements will be coordinated with traffic marshals at the site gates;
- Lifting will cease immediately in adverse weather conditions, including high winds.

Where limited crane oversail outside the site boundary is unavoidable, this will be managed in accordance with industry best practice, with appropriate legal agreements, safety controls and advance notification procedures in place.

The crane strategy will be reviewed periodically as the works progress, particularly during transitions between superstructure, cladding and external works phases, to ensure continued compliance with safety and logistics requirements.

4.5 Wheel Washing

A portable wheel wash system will be installed at the site access point, consisting of a ramp with integrated brushes and water jets. All departing vehicles will be required to pass through this facility prior to rejoining the internal access route. Wastewater will be captured via a bunded containment tray and processed through a silt trap and filtration unit before discharge. Sediment will be removed weekly or as required.

The wheel wash will be regularly maintained to ensure it works efficiently, including checking for blockages, cleaning any traps or filters and the topping up water levels. Clear signage will direct all vehicle drivers to use the facility, and site staff will monitor compliance. All wheel washing and cleaning activities will be logged by the site supervisor and made available for inspection upon request.

Wheel wash facilities, road sweepers and damping-down arrangements will be inspected at the start of each working shift and monitored throughout the day. Additional inspections will be undertaken during wet weather conditions, muck-away operations or periods of elevated vehicle activity.

4.6 Abnormal Loads

Certain materials and equipment may be transported to the site as abnormal loads, which exceed the standard dimensions or weight limits set for road vehicles. These loads will be managed in strict accordance with the law, specifically under the *Road Vehicles (Authorisation of Special Types) (General) Order 2003 (STGO)* and associated regulations.

To ensure safe delivery and minimise disruption, the following best practice measures will be implemented:

- Notification of abnormal loads will be provided to the relevant authorities at least 2 working days in advance, as required.
- A traffic management plan will be implemented including the use of escort vehicles where required by law.
- The vehicles used will be compliant with weight, length, and axle-load regulations and will meet emission standards.

At present, abnormal or oversized deliveries are anticipated to be limited. Likely examples may include tower crane components, mobile cranes associated with crane erection, and delivery/removal of large construction plant.

Current piling plant is expected to utilise the standard approved delivery route without requiring abnormal load permits or additional highway controls. Any future abnormal loads will be assessed individually in coordination with the relevant subcontractor, haulage provider and Highway Authority, with additional traffic management measures implemented where necessary.

Construction Phase	Potential Abnormal Load Type	Anticipated Frequency
Site Setup and Demolition	Large Excavators	Low
Basement Excavation and Piling	Piling Plant	Low
Superstructure	Tower Crane Components / Mobile Crane	Low
Cladding	None anticipated	None
Fit-Out	None anticipated	None
Table 4.1: Anticipated Abnormal Loads by Construction Phase		

4.7 School Streets

None of the surrounding streets of the proposed development are designated as *School Streets* by Haringey.

5 CMS - Strategies to Reduce Impacts

5.1 Planned Measures for Medium Impact Site

Table 5.1 outlines the measures that will be employed to reduce the impact of construction.

High Impact Site	Planned Measures Checklist	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 logistics and consolidation centres				X
Vehicle Choice		X		
Measures to encourage sustainable freight				
Freight by Water*				X
Reflight by Rail *				X
Material procurement measures				
DfMA and off-site manufacture				X
Re-use of material on site				X
Smart procurement				X
Consolidated deliveries where practicable		X		
Suppliers encouraged to collect pallets, stillages and packaging for reuse		X		
Reuse of materials where reasonably practicable		X		
Reverse logistics measures implemented where feasible to reduce empty return trips.		X		
Other measures				
Collaboration amongst other sites in the area		X		
Implement a staff travel plan		X		
No HGVs during morning and afternoon peak		X		
Table 5.1: Measures that will be employed to reduce the impact of construction				

5.2 Measures Influencing Construction Vehicles and Deliveries

Safety and Environmental Standards and Programmes

To ensure the safe and effective management of construction vehicle movements throughout the Tangmere project, the contractor will deploy trained and designated traffic marshals and banksmen. All personnel undertaking these duties will be LANTRA-qualified or hold an equivalent traffic management certification suitable for operating within a live residential estate.

All construction-related vehicle operators accessing the site will be required to hold FORS Silver accreditation as a minimum. This requirement applies to the principal contractor, subcontractors and any third-party hauliers.

In addition to the above, all subcontractors operating large vehicles over 7.5 tonnes must meet the following conditions:

- All drivers must have undertaken cycle awareness training such as the Safe Urban Driver module through FORS or similar.
- All vehicles associated with the construction of the development must have side guards fitted *
- They must also have a close proximity warning system fitted, comprising of a front-mounted, rear-facing CCTV camera (or Fresnel Lens where this provides a reliable alternative), a Close Proximity Sensor, an in-cab warning device (visual or audible), and an external warning device.
- They must have a Class VI Mirror and signage on the rear to warn cyclists of the dangers of passing on the inside.

*(unless it can be demonstrated to the reasonable satisfaction of the employer, that the lorry will not perform the function for which it was built if side guards are fitted)

NRMM

Non-Road Mobile Machinery (NRMM), including plant, generators and mobile equipment, will comply with the Greater London Authority NRMM Low Emission Zone requirements. NRMM will be registered on the online GLA NRMM register prior to use, with compliance records kept on site.

Adherence to Designated Routes

All subcontractors and suppliers will be issued the approved routing plan for Tangmere.

Delivery Scheduling

The following procedures apply:

- All deliveries must be pre-booked via the digital delivery management system.
- Only one HGV delivery will be permitted on the estate at any given time.
- Drivers must call the site 20 minutes prior to arrival and may only proceed once authorised.
- Vehicles arriving without a booking or outside their allocated slot will be turned away.
- No vehicles may stack, idle or wait on Lordship Lane, Adams Road, Willan Road or surrounding estate roads.
- All deliveries will be just-in-time and take place within permitted delivery hours.
- Traffic marshals will be present for all delivery movements.
- Banksmen will guide reversing or complex manoeuvres within the site boundary.

The above requirements will be written into all supplier and subcontractor contracts.

Delivery Scheduling Software

As stipulated in TfL's Construction Logistics Plan guidance document, the minimum requirement is for the developer to use a delivery booking management system.

The construction manager will be responsible for supervising, controlling, and monitoring vehicle movements to and from the site. A software-based tool will be used by the contractor and subcontractors to ensure that the route vehicles take to and from the site is as efficient as possible, while avoiding any unsuitable or restricted roads.

Re-timing for out of peak deliveries

Suppliers will be encouraged to schedule deliveries during inter-peak periods to reduce congestion within the estate. Deliveries will not be permitted during school peak pedestrian hours (08:00–09:30 and 15:00–16:30).

Re-timing for out of hours deliveries

No routine out-of-hours deliveries are proposed as part of the development. Should exceptional circumstances arise requiring a specific delivery outside standard working hours, this will be subject to prior agreement with the London Borough of Haringey and relevant stakeholders.

Use of holding and vehicle call off areas

There is no holding capacity within Broadwater Farm Estate.

Consolidation of loads will be reviewed to reduce the total number of delivery movements. However, this approach needs to be balanced with the limited road width on the Broadwater Farm Estate thus a preference to avoid articulated lorries if possible.

Use of logistics and consolidation centres

Logistics and consolidation centres have been considered but there are none close enough to the development to make the endeavour feasible.

5.3 Measures to Encourage Sustainable Transport

Freight by Rail

Freight by rail is currently not proposed due to no railway stations being in the vicinity of the site that would be appropriate to carry construction material. The nearest stations are for public transport only.

5.4 Material Procurement Measures

DfMA and Off-Site Manufacture

No off-site manufacturing measures are proposed.

Re-use of Material On-Site

The Tangmere building was demolished in advance of the main works, and no existing materials remain suitable for reuse.

Smart Procurement

A smart procurement strategy will be implemented to source materials from local suppliers where possible, reducing transportation distance. The procurement process will prioritise suppliers with strong sustainability credentials and a commitment to reducing packaging waste and carbon emissions. This can also create efficiency through economies of scale and through the management of fewer suppliers so is strongly encouraged.

Beyond that, potential suppliers for main trades and packages will be asked about their approach to logistics and the number of vehicle movements (and total number of miles travelled) planned. This will help try and minimise the number of vehicle movements. Digital tools at Head Office level will be used to track the environmental impact of the supply chain.

5.5 UXO

An Unexploded Ordnance Report has been undertaken for the scheme and a copy can be found in the Appendices.

The report classifies the site as “Medium Risk” and contains mitigation measures and recommendations that the contractor will implement and follow.

5.6 Asbestos

The site has been demolished thus asbestos is not present and no survey has been undertaken and/or required.

5.7 Pest Control

Avoiding vermin infestations is important for construction sites. Complaints have risen in recent years as vermin issues increase. Guidance, including from *Pest minimisation - Best practice for the construction industry* by CIEH, recommends:

Waste Management

- All waste, particularly food waste, will be stored in lockable, vermin-proof containers.
- Waste removal will occur regularly. Skips will be covered; any loose waste will be cleared immediately.
- Food waste and biodegradable materials will be segregated and disposed of as a priority.

Site Management

- A site-wide housekeeping policy will be enforced, with regular clearing and removal of debris that may attract vermin.
- Construction materials will be stored off the ground and covered and/or netted to prevent nesting opportunities.
- Hoarding, welfare facilities and site offices will be inspected and maintained to restrict access by rodents.
- All site personnel will receive toolbox talks on recognising pest activity and the importance of maintaining site hygiene.
- A pest control log will be maintained, detailing inspections, treatments, and corrective actions.

Monitoring and Control

- Weekly inspections will identify early signs of pest activity to ensure prompt action.
- In the event of persistent and increasing vermin sightings, a professional pest control service will be employed.
- Bait stations and/or monitoring devices will be installed by the licensed pest control contractor.

If a worst-case scenario of infestation occurs, and a professional pest control service are unable to resolve the issue, the contractor will take such action to deal with it as required by the Environmental Health Officer following liaison with them.

5.8 Drainage and Surface Water

Groundwater

The site is not located within a groundwater Source Protection Zone and there are no groundwater or surface water abstraction licenses within 500m of the site.

Watercourses & Flood Risk:

The highest surface water flooding risk on the site is high (1 in 30 year return period) and the groundwater flooding risk is moderate (risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model).

Site Drainage and Surface Water Protection Measures

Surface runoff will be discharged to sewers where reasonably practicable. The site drainage will meet the requirements for effluent and flood risk standards as required by the sewerage undertaker.

During construction, protection measures to control the risk of pollution to surface water will be adopted. These will include:

- Any containers of contaminating substances on site will be leak proof and kept in a safe and secure compound.
- Impermeable bunds with a capacity of 110% of the maximum stored volume.
- Areas for transfer of contaminating substances will be similarly protected.
- All refuelling, oiling and greasing will take place above drip trays or on an impermeable surface which provides protection.
- Vehicles will not be left unattended during refuelling.
- All wash down will take place in designated areas and wash water will not pass untreated into watercourses.

The EA's Pollution Prevention Guidance, Pollution Prevention Measures and good construction practices will ensure that any oils, hydrocarbons or hazardous materials stored on site will not leak onto the ground surface and thereby ensure that there is no pathway for contaminants to affect the water course.

5.9 External Lighting

The site is located in a predominantly residential area and on-street lighting is present on Willan Road. The adjoining school also has external lighting at night.

There are no ecological considerations to factor in for the external lighting design.

There is no single dedicated standard for the external lighting on construction sites but relevant standards include:

- BS EN 12464-2:2014 (Lighting for Outdoor Workplaces),
- BS 5489-1:2020 (Design of Road Lighting), and
- BS 7671:2018+A3:2024 (IET Wiring Regulations).
- Institute of Lighting Professionals (ILP) Guidance Note 01/21 – The Reduction of Obtrusive Light,
- Health & Safety Executive (HSE) - Construction Site Safety Guidelines
- HSE - 'Lighting at Work' (HSG38)

Lighting will consist of temporary, weather-resistant LED floodlights / bulkheads (IP65-rated or higher). These will be split into the following areas (with specific guidance for these areas highlighted below):

- Site - High-intensity directional floodlights mounted on 3–4m poles.
- Material Storage Areas - Broad beam lighting with a 120-degree spread
- Active Work Zones - Portable task lighting units positioned to minimise shadowing and allow targeted lighting
- Hoarding - Motion-activated lights

All luminaires will use warm white (3000K–4000K) LEDs to balance effective illumination with minimal glare and light pollution. Lighting will be designed to achieve an average illuminance of 50 lux for general areas and 100 lux for high-risk areas (HSE recommendations for construction sites.) Control measures could include the use of timers, photocells, and PIR sensors. Spill shields and louvres will be installed on floodlights to focus illumination within the site.

5.10 Hoarding

Hoarding will be installed around the perimeter of the site as per the Highways Act 1980, The New Roads and Street Works Act 1991 and The Construction (Design and Management) Regulations 2015 (CDM 2015). It will be specified to incorporate the following in terms of design and installation, lighting, maintenance, safety and community engagement:

- Use durable materials that can withstand weather conditions.
- Ensure hoardings are stable and securely fixed to prevent collapse.
- Design hoardings to allow for the display of safety notices, project information, and community updates.
- Install adequate lighting to illuminate footpaths and signage, enhancing safety for pedestrians.
- Regularly inspect and maintain hoardings to ensure they remain in good condition.
- Follow HSE guidelines for the safe erection and dismantling of hoardings.
- Ensure compliance with relevant sections of the Highways Act and New Roads and Street Works Act.

For this scheme, the proposed hoardings will be a 2.4m high hoarding. The hoarding will be plywood faced, timber framed and of a surface density of not less than 7kg/m² for normal security and noise limitation requirements. Based on the scheme proposals, acoustic hoarding is not deemed necessary for noise mitigation requirements.

Adequate security will be exercised to prevent unauthorised entry to or exit from the site. Site gates will be closed and locked when there is no site activity and site security provisions will be set in motion. Provision of CCTV may follow subject to a risk assessment. Hoardings will be finished in either paint or with the customers graphics dependant on their location and client requirement.

All hoarding adjacent to pedestrian routes will maintain safe and accessible pedestrian widths in accordance with approved traffic management arrangements. Site gates opening onto pedestrian routes will open inwards only to avoid obstructing footways or creating hazards for pedestrians, wheelchair users, mobility impaired persons, cyclists or those with buggies.

5.11 Other Measures

Collaboration Amongst Other Sites in the Area

As of the date of this document, construction works at Moselle shall be completed before Tangmere begins. At this stage, it is not anticipated that other phases of the Broadwater Farm masterplan will move forward until Tangmere is complete. This could be subject to change. If this is the case, an exercise of understanding the cumulative impact will be undertaken.

Monitoring of planning approvals and active construction sites will continue throughout the programme.

6 Staff Travel Plan

The below is a Staff Travel Plan that will be implemented to promote sustainable transport options for workers. The plan will encourage the use of public transport, cycling, and carsharing to reduce single-occupancy vehicle use.

The site is in an area of very high public transport accessibility so all staff will be made aware to take public transport to the site wherever possible.

6.1 Key Aim

There is an aim to reduce single-occupancy vehicle use by 25% during the course of construction.

6.2 Project Details

Some key project details are:

Element	Information
Directly employed staff on-site	7
Sub-contractors at peak	72
On-site cycle racks	Yes. <u>U</u> sed pallets from deliveries are recycled to make bike racks.
On-site showers	Yes

Table: Travel Plan Parameters

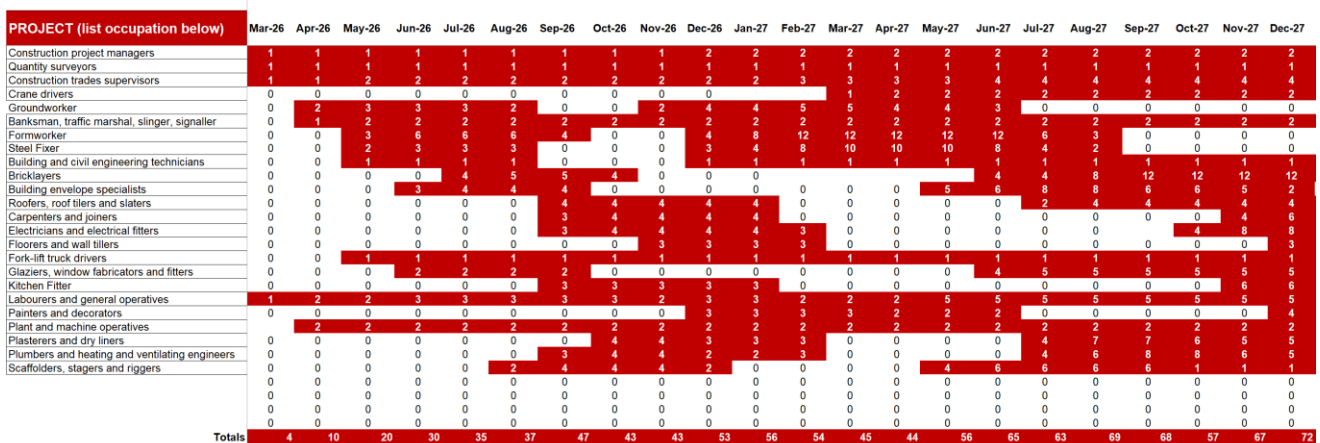


Figure: Labour Histogram (Partial)

6.3 On-Site Parking

There is no car parking on-site.

6.4 Off-Site Parking

Due to the scale of the proposals that car journeys will be unavoidable. Should car parking be required, the nearest is a 15-minute walk away at Seven Sisters Station:

Westerfield Road Car Park, 43 Westerfield Road, London Borough of Haringey, London, N15 5LD

Daily Ticket: £8.10. More details are here: <https://haringey.gov.uk/parking/car-parks>

6.5 Travel Surveys

At the beginning of the peak construction phase (September 2026), brief staff travel surveys will be undertaken with site operatives and contractors as part of regular toolbox talks. The surveys will record how staff are travelling to and from the site, including mode of travel, typical arrival and departure times, vehicle occupancy, parking arrangements, and any barriers to using public transport, walking, cycling or car sharing.

Where required, travel information, public transport options, local walking and cycling routes, and any site-specific travel requirements will be re-briefed through subsequent toolbox talks and displayed within the site welfare area.

6.6 Travel Plan Measures

Car Sharing

Promoting car sharing among site workers is a priority. A WhatsApp group or similar will be set up that can help workers easily coordinate lifts. Sub-contractors will be encouraged to attend site in as few vehicles as possible.

Public Transport Access Promotion

The site is walkable from Seven Sisters Station, providing access to public transport. There are also local bus routes.

Full details of local public transport will be displayed within the staff canteen and promoted during toolbox talks.

Micromobility

Lime Bikes are available in the vicinity and will be promoted for those who might want to cycle and not have their own bikes or are looking to potentially cycle one-way.

6.7 Monitoring and Review

Monitoring and review of staff travel arrangements will be undertaken throughout the construction phase. This will include periodic checks on staff travel modes, local parking behaviour, cycle parking demand and any complaints or issues raised by neighbours.

Where issues are identified, the Site Manager will review the existing arrangements and implement proportionate corrective measures. The approach will remain proportionate to the scale and duration of the works.

6.8 Overall Impact

Due to the location of the site in an area of high PTAL, usage levels of the local roads being high (as per DfT figures) and construction methods reducing on-site labour where possible, any unavoidable staff travel will not add any noticeable impact to the local road network.

7 CLP - Estimated Vehicle Movements

7.1 Construction Vehicles

The scope of works and the size of the scheme mean that the construction phases below won't be undertaken sequentially or in isolation. The overlap will be one phase completing at the same time another starts. Therefore, the delivery numbers should remain consistent with the document. At most, numbers will increase 10-20% during peak overlap.

Construction phase	Period of stage	No. of trips (monthly)	Peak no. of trips (daily)
Site setup and demolition	Q2 2026 - Q3 2026	100	5
Basement excavation and piling	Q4 2026 - Q1 2027	100	5
Sub-structure	Q1 2027 - Q2 2027	160	8
Super-structure	Q2 2027 - Q4 2028	160	8
Cladding	Q4 2027 - Q1 2029	40	2
Fit-out, testing and commissioning	Q2 2027 - Q1 2029	100	5
Peak period of construction	Q1 2027 - Q1 2029	160	8

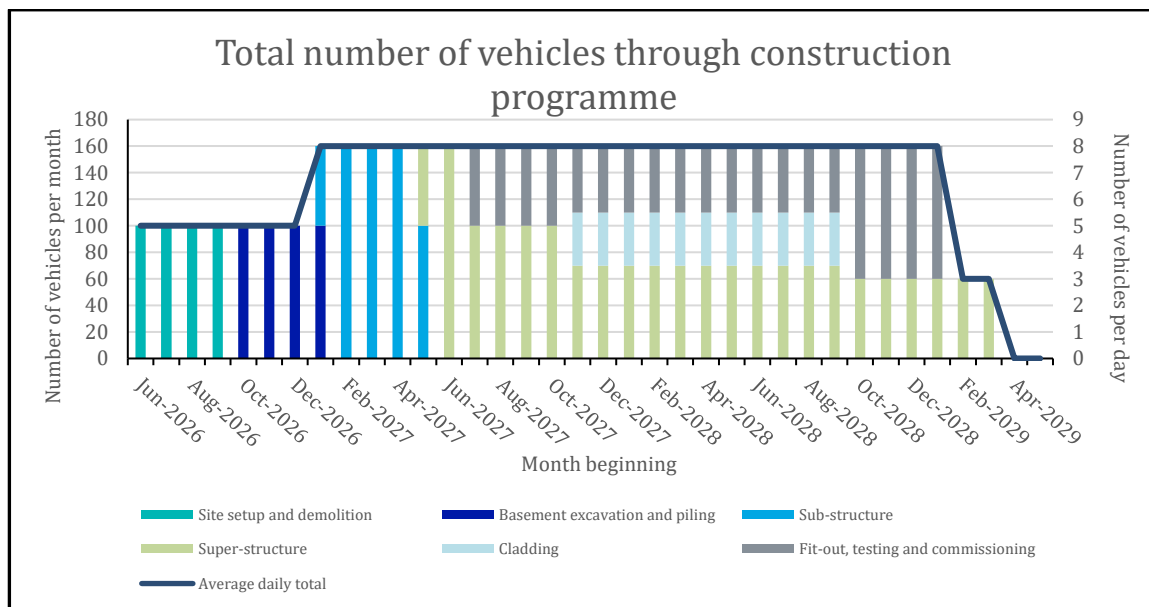


Figure 6.1: Construction Vehicles – Monthly and Daily

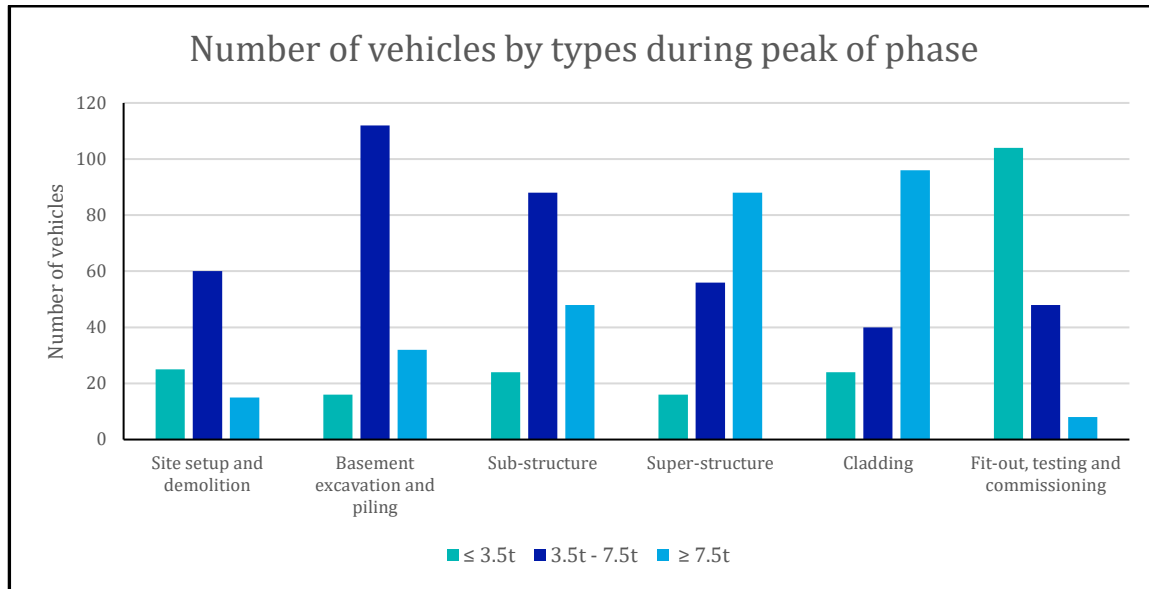


Figure 6.2: Estimated Construction Vehicles – Monthly and Daily

During these peak phases of delivery during construction efforts will be made by the appointed contractor to avoid peak times to avoid vehicle congestion.

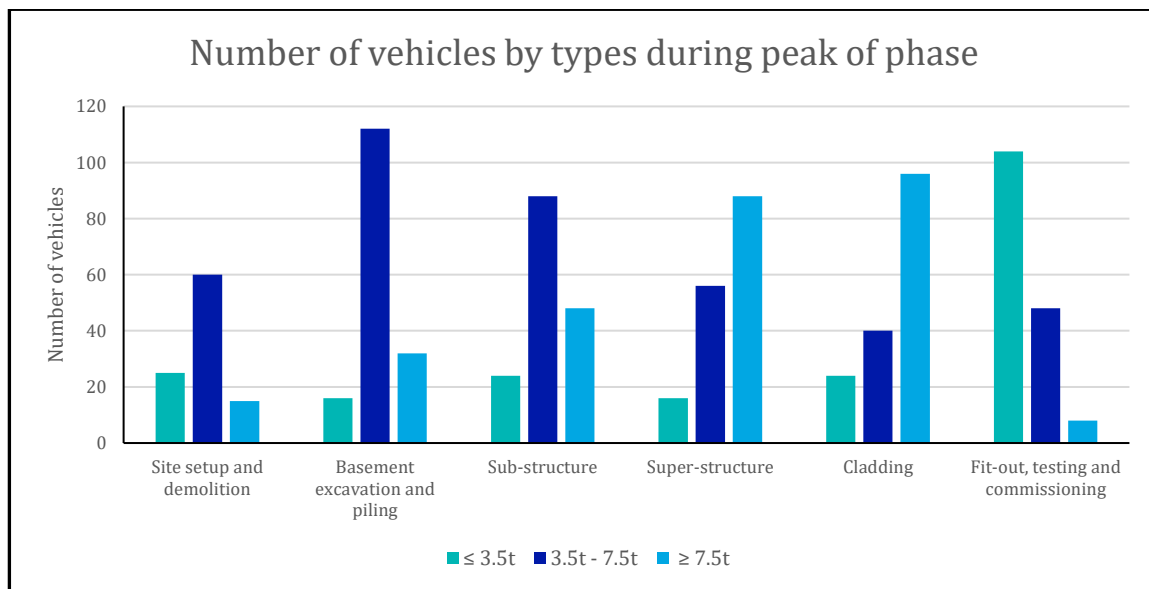


Figure 6.3: Hourly Arrival Profile of Vehicles During Peak

8 CMS - Sensitive Receptors

Tangmere is located at the heart of the Broadwater Farm Estate and is surrounded by sensitive receptors including residential dwellings, community facilities, high-footfall pedestrian routes, and local schools. Sensitive receptors have been assessed considering:

- Site context and proximity to occupied properties.
- Anticipated noise, dust and vibration from construction activities.
- The presence of vulnerable road users.
- The impact of vehicle routing on estate roads.
- Feedback from London Borough of Haringey and local residents.

The table below identifies receptors that may be affected by construction activity and outlines potential impact pathways and mitigation measures.

Receptor	Assessment of Receptor	Sources of emissions and pathways of impact	Defined limits for each impact type	Recommendations
Residential Properties on Willan Road, Gloucester Road, and Adams Road (Stapleford, Rochford, Lympe Blocks and adjacent maisonettes)	Primary receptors due to very high sensitivity to noise, dust and vibration. These dwellings directly overlook the Tangmere site and lie on routes used for construction access.	Airborne noise from plant and machinery; dust from groundworks, concrete operations and façade works; vibration from piling and heavy plant; visual intrusion; vehicle movements along estate roads.	Noise: BS 5228 daytime thresholds (typically LAeq,10hr 70–75 dB). Dust: IAQM 150 µg/m³ (1-hour mean) PM ₁₀ action level. Vibration: 1–3 mm/s PPV for residential annoyance (BS 6472).	• Real-time dust and noise monitoring at residential boundaries. • Strict delivery restrictions during peak pedestrian hours. • Acoustic barriers during piling and high-impact works. • Advance notifications to residents of noisy activities.
The Willow Primary School (Adams Road)	High sensitivity due to heavy pedestrian activity by children, parents and staff during peak hours. Located near the construction haul road approach.	Noise from early works; dust drift during dry conditions; risk of pedestrian-vehicle interaction during deliveries; congestion on Adams Road.	Noise: Must comply with Haringey construction hours. Dust: IAQM site boundary levels. Pedestrian safety: CLOCS standards for vulnerable road users.	• Absolutely no deliveries during 08:00–09:30 and 15:00–16:30. • Traffic marshals stationed at school approach route. • Maintain clean and unobstructed footways. • Enhanced dust suppression on haul road.

Receptor	Assessment of Receptor	Sources of emissions and pathways of impact	Defined limits for each impact type	Recommendations
Public Footways on Gloucester Road and Willan Road	High sensitivity due to continuous resident use and high footfall. Pedestrians include children, older residents and vulnerable road users.	Noise and dust from nearby works; temporary narrowing of footways during hoarding adjustments; conflict risk at site access points; obstruction risk during crane lifts.	Noise: BS 5228 limits and site working hours. Dust: <150 µg/m ³ PM ₁₀ site boundary threshold.	• Maintain safe segregated pedestrian routes at all times. • Install clear wayfinding signage. • Provide traffic marshals during heavy vehicle movements. • Keep footways clear of materials and debris.
Estate Play Areas and Open Spaces (Broadwater Farm Central Green Spaces)	Used by children and families throughout the day, making them sensitive to noise, dust and heavy vehicle movements.	Airborne dust; intermittent noise from construction plant; temporary changes to pedestrian desire lines.	As per IAQM and BS 5228 limits.	• Install dust suppression during dry conditions. • Maintain safe access routes around play areas. • Avoid noisy works during weekends or community events.
Bus Stops on Lordship Lane (Routes 123, 243, 149, 279, W4, 341, 349)	High sensitivity due to high passenger turnover and public reliance on uninterrupted bus services.	Noise and dust near bus stops; pedestrian congestion; potential conflict with construction vehicles joining or leaving Lordship Lane.	Operational limits: No obstruction or delay to TfL bus operations.	• Ensure construction traffic does not impede bus lanes. • Traffic marshals to manage interface at Adams Road junction. • Advance liaison with TfL if abnormal loads require temporary controls.
Local Businesses near Lordship Lane and Mount Pleasant Road	Moderate sensitivity due to reliance on footfall and ease of access.	Noise and dust affecting patrons; temporary congestion on estate access roads; obstruction if deliveries are not controlled.	BS 5228 and IAQM thresholds.	• Notify businesses of significant works. • Maintain unobstructed footway access. • Schedule noisy works outside peak retail hours where practicable.
Cyclists travelling through Broadwater Farm Estate and surrounding estate roads	High sensitivity due to interaction with construction traffic along estate access routes and haul road crossings.	Potential conflict with HGV turning movements, restricted visibility near hoarding lines and temporary haul road activity.	CLOCS and FORS vulnerable road user safety standards.	• Traffic marshals present during deliveries. • Cyclist warning signage installed at haul road crossings. • Low-speed vehicle movements enforced. • Existing cycle routes and nearby cycle parking retained where practicable.

Table 7.1: Sensitive Receptors

8.1 Neighbourhood Consultation Strategy

Formation places genuine emphasis on stakeholder and community engagement and want to leave a lasting legacy behind that provides beyond that of simply delivering a successful project. Social Value commitments have been made that will primarily benefit the Broadwater Farm Estate residents and local community.

The success of delivering a project depends on the ability to engage with and respond to the local community, neighbours, schools and wider stakeholders. Formation aims to establish and maintain a proactive dialogue with the community to ensure a comprehensive understanding of the project's impact and to respond promptly to any queries.

The stakeholder engagement strategy ensures that the appropriate method of engagement is delivered. The contractor will update the neighbours of the construction progress primarily in the form of letter drops. An initial letter will provide the following information:

- a. Description of the development;
- b. Logistics of the development;
- c. Proposed construction methodology highlighting any phases where disruption may occur;
- d. Duration of the development;
- e. Details of the Principal Contractor's direct responsive contact for local residents.

A notice board will be affixed to the site entrance. This will include site contact information in the forms of email and phone number regarding any likely impact the works may have in relation to noise or deliveries.

8.2 Community Engagement & Liaison Officer

There is a dedicated and experienced Community Engagement Officer for the scheme, with local knowledge gained during previous projects in London with similar briefs.

Current Details (subject to change) are:

Community Engagement & Social Value Officer Details	
Name	Anita Collopy
Telephone Number	TBC
Email	Acollopy@formationdnb.co.uk

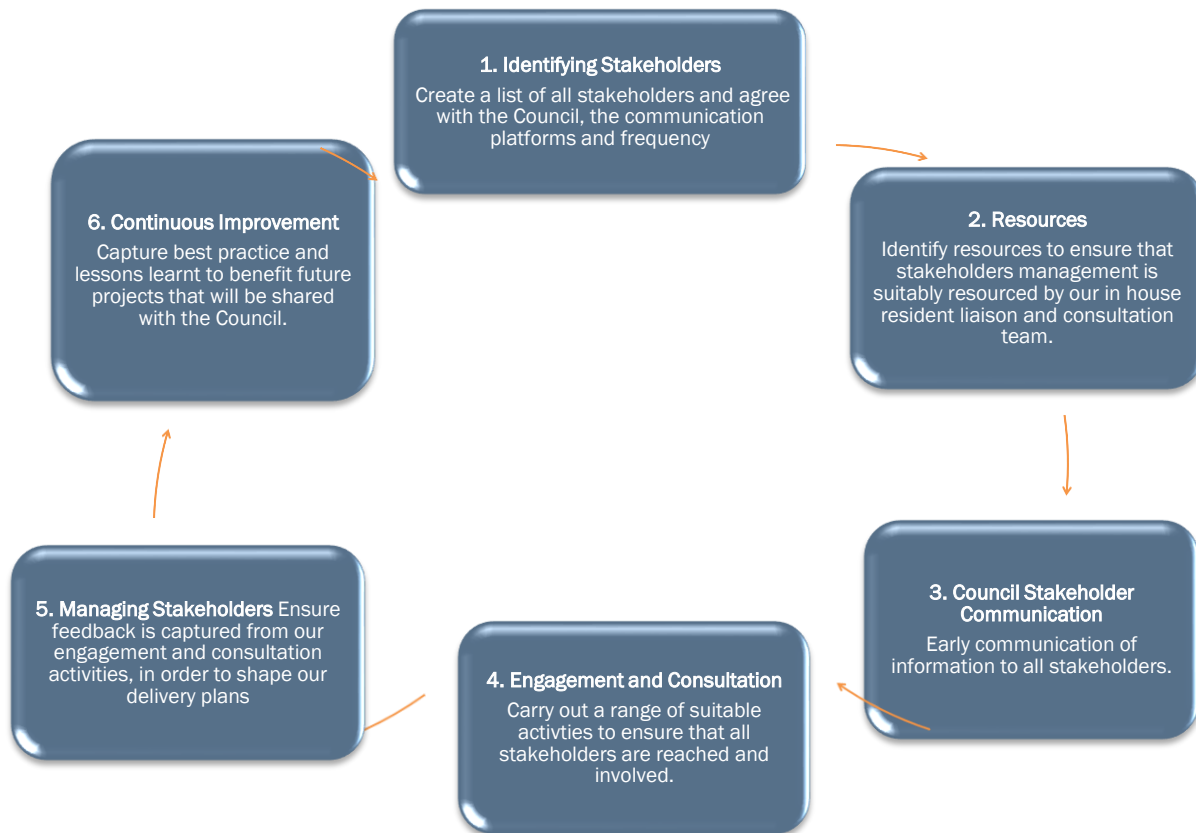
The Community Engagement Officer will have an open-door policy. This policy ensures that the officer is accessible to any member of the community who wishes to discuss the project. Formation believes in transparency and open communication and understand that their activities will impact the daily lives of residents and stakeholders.

The community will have the ability to have regular, easy access to the Community Engagement Officer through a dedicated telephone number and email. Alternative contact methods may be offered, such as social media or a dedicated website contact form.

8.3 Local Schools

The site is located within a predominantly residential area, with several educational institutions nearby. **Construction vehicle movements will be managed to avoid school drop-off and pick-up periods between 08:00–09:30 and 15:00–16:30 wherever reasonably practicable. Exceptions will be limited to safety-critical operations, emergency works or specific concrete pours where alternative arrangements are not feasible.**

8.4 Engagement Strategy – Overall Project



Some measures to be undertaken by Formation include:

- Monthly newsletters.
- Regular updates to the project website and notification on the Local Authority website.
- Ad hoc notices of key site events, such as early morning crane deliveries.
- Attend regular meetings with resident groups and local stakeholders.

8.5 On-Site Measures

Site operatives, including the supply chain and site visitors, will receive training in respectful public liaison at their site induction training.

The Community Engagement Officer will attend the project progress meetings. This will ensure stakeholder and residential interests are accounted for in methodologies, programmes, and schedules for deliveries. Furthermore, they will provide regular feedback to the project team on community sentiment, concerns, and suggestions, ensuring a two-way dialogue between the project and the community.

8.6 Considerate Constructors Scheme

The site will be registered with the Considerate Constructors Scheme (CCS). The contractor will target a minimum score of 39, with scores of 13 or higher in each CCS category. The CCS Code will guide behaviour relating to respect for the community, safety, environmental protection and workforce welfare.

9 AQDMP - Control of Emissions – Dust, Dirt and Air

9.1 Dust Risk Assessment

The Dust Risk Assessment (DRA) for the proposed development has been prepared in accordance with:

- London SPG: The Control of Dust and Emissions During Construction and Demolition (2014).
- IAQM Guidance on the Assessment of Dust from Demolition and Construction (Version 2.2, 2024).
- GLA Practice Note (2024) confirming continued applicability of the 2014 SPG and use of the updated IAQM methodology.

The assessment identifies potential dust and particulate emissions arising from each phase of the proposed works at Jubilee House. It assigns a dust risk magnitude, evaluates the sensitivity of the surrounding area, and determines the required mitigation measures to minimise impacts. The IAQM five-step process is followed:

- STEP 1: Screening the need for a detailed assessment
- STEP 2: Assessing the risk of dust impacts arising
- STEP 3: Identifying site-specific mitigation measures
- STEP 4: Determine Significant Effects
- STEP 5: Dust Assessment Report

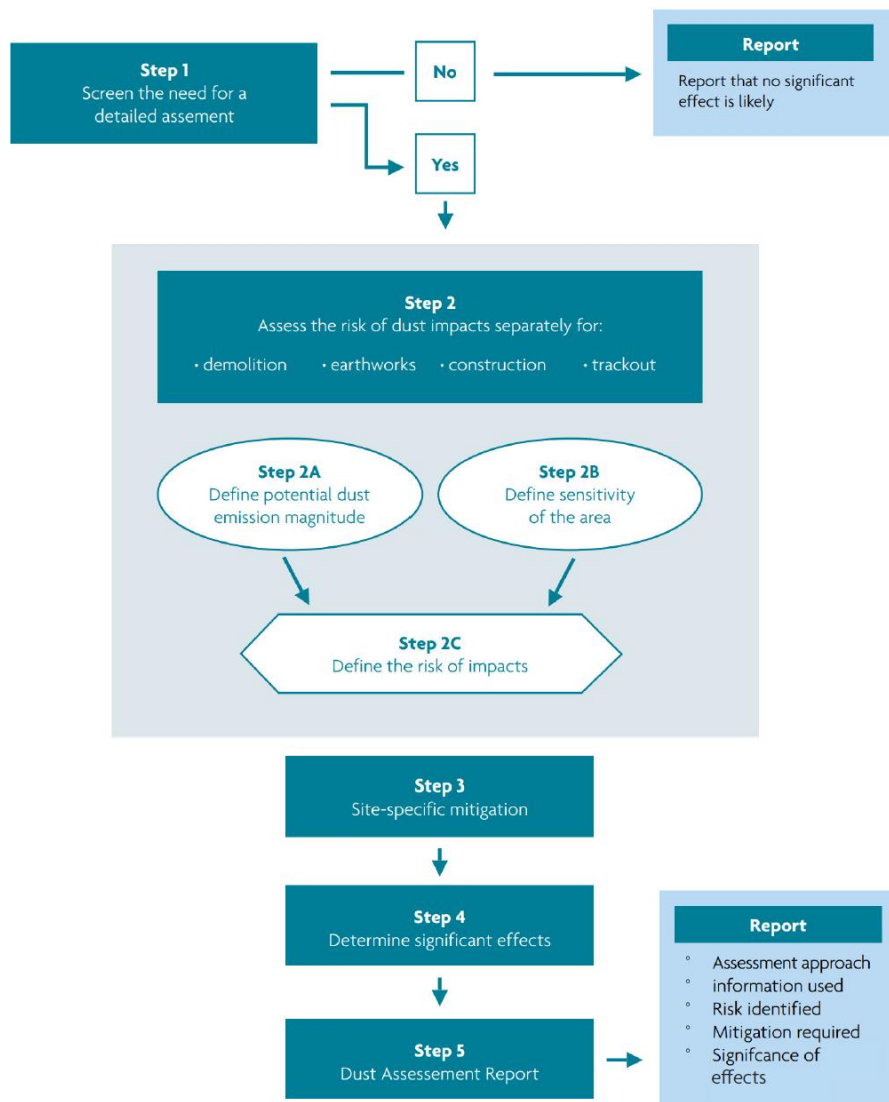


Figure 8.1: Dust Risk Assessment Steps

Step 1 – Site Screening

A detailed dust assessment is required because:

- The site lies within the London Borough of Haringey Air Quality Management Area (AQMA).
- Residential properties are located 0–30 m from site boundaries.
- The new temporary haul road passes close to sensitive pedestrian routes used daily by residents.
- Public footways on Gloucester Road and Willan Road run directly adjacent to works.
- A local primary school is within walking distance and experiences heavy pedestrian flows.

No ecological designations exist within 50 m.

Step 2a - Define the Potential Dust Emission Magnitude

Dust emission magnitudes have been determined for each activity using IAQM criteria.

Enabling Works / Hardstanding Breakout

Scope of Works	No building demolition remains at Tangmere; however, early works include removal of residual hardstanding, site clearance, excavation for haul road formation and foundation exposure.	
Descriptors	Result	Classification
Scope of works	Removal of slabs, foundations and hard surfaces	—
Material for dust release	Concrete, mixed made ground	Medium
Mechanical activity	Moderate (excavators, breakers)	Small–Medium
Overall Classification	Small to Medium	

Earthworks Phase

Scope of Works	Earthworks include excavation for crane bases, drainage trenches, localised ground reduction and preparation of substructure levels.	
Descriptors	Result	Classification
Volume of material moved	<5,000m ³	Small
Dust potential from soils	Mixed made ground	Small
Overall Classification	Small	

Construction Phase

Scope of Phase	Construction includes erection of a structures, façade works, roofing, and internal fit-out.	
Descriptors	Result	Classification
Total Build Volume	Total building volume >25,000 m ³	Medium
Material for dust release	Brickwork, concrete, insulation, lightweight elements	Medium
Overall Classification	Medium	

Trackout Phase

Scope of Phase	Trackout risk considers the potential for dust transfer via vehicle wheels from the temporary haul road and site exits.	
Descriptors	Result	Classification
HGV trips per day	<20	Small
Site Surface	Mostly paved haul road, controlled surface	Small
Wheel transfer potential	Low due to wheel washing and paved exit	Small
Overall Classification	Small	

Step 2b - Sensitivity of the Area

Sensitivity to Dust Soiling

Descriptors	Result	Sensitivity
Residential receptors	>100 within 20–50 m	High
Public footways	Immediately adjacent (0–5 m)	High
Vulnerable users	Schoolchildren and Elderly residents	High
Pedestrians	High footfall throughout the estate	Medium to High
Overall Risk Classification	High	

Sensitivities of People to the Health Effects of PM₁₀

Descriptors	Result	Sensitivity
Number of Receptors	>100	High
PM ₁₀ baseline	<24 µg/m ³	Medium
Distance to receptors	0–20 m	High
Overall Risk Classification	Medium	

Haringey is designated an AQMA for PM₁₀ and NO₂. DEFRA mapping shows urban background PM₁₀ concentrations within compliance of the 40 µg/m³ annual mean objective but relatively elevated as typical for inner London. The predicted baseline PM₁₀ annual mean concentration for the 1km grid square covering the site, based on DEFRA UK-AIR GIS Tool, is **15 µg/m³**. This provides an indication of the annual mean concentrations at receptors near the development site.

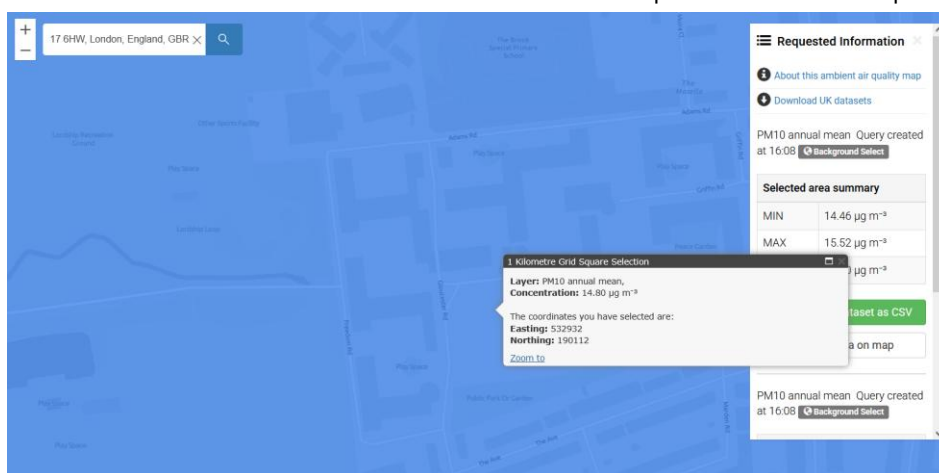


Figure 8.2: DEFRA UK-AIR GIS Tool site search

Ecological Receptors – DEFRA Magic Map Search

No ecological designations lie within the IAQM threshold.

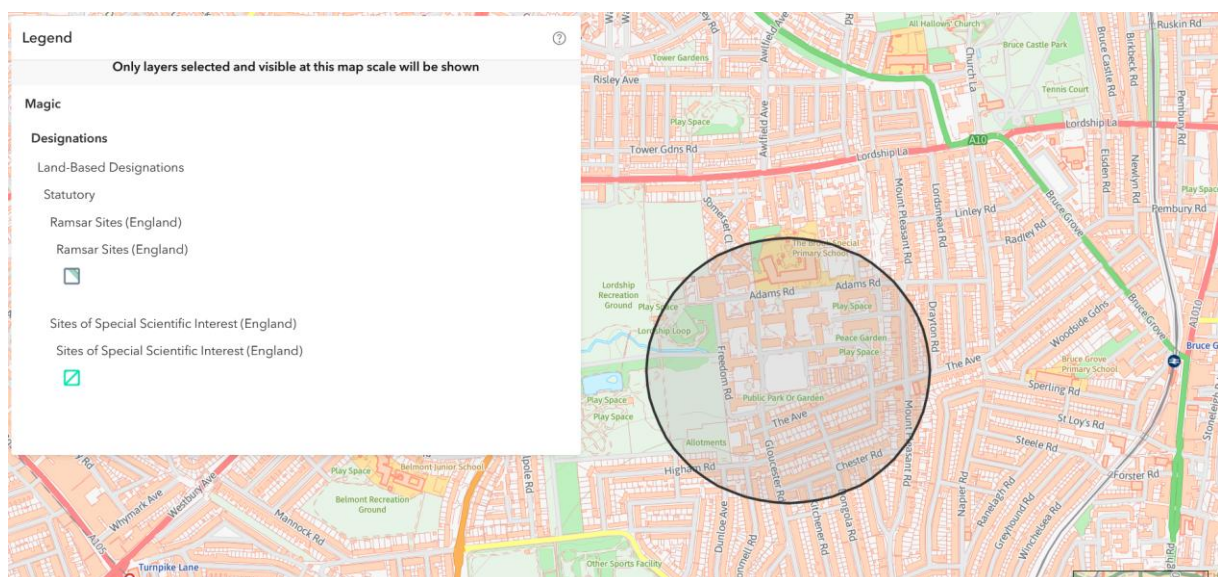


Figure 8.3: DEFRA MAGIC Map search - 250m radius from site

Overall Risk Classification

Low

Step 3 – Dust Risk Classification

Using IAQM risk matrices:

Activity	Dust Emission Magnitude	Sensitivity of Area	Risk Classification
Earthworks	Small	High Risk	Low–Medium Risk
Construction	Small–Medium		Medium Risk
Trackout	Small		Low Risk
Table: Overall general result of Dust Risk Assessment			

Step 4 – Summary of Risk of Impacts Without Mitigation

Potential Impact	Dust Risk			
	Demolition	Earthworks	Construction	Track-out
Dust Soiling	N/A	Medium to High Risk	Medium to High Risk	Low Risk
Human Health		Medium Risk	Medium Risk	Low Risk
Ecological		Low Risk	Low Risk	Low Risk
Table: Summary of Risk of Impacts Without Mitigation				

Given the proximity of residential receptors on all sides, demolition and general construction are classified as **Medium Risk** processes.

Step 5 – Dust Assessment Report and Requirement for Monitoring

Based on the IAQM classification:

- Automatic real-time particulate monitoring (PM₁₀) is required along estate-facing boundaries.
- At least two monitors should be positioned on the north and east boundaries, facing Rochford, Lympe receptors.
- Daily visual inspections must be undertaken and recorded, including public footways and the temporary haul road.
- Dust control measures must follow GLA SPG and IAQM mitigation appropriate to a medium-risk site.

Monitoring locations and procedures are further described in the following sections.

10 AQDMP - Dust Control Measures

Mitigation of dust, dirt and airborne particulate matter is essential to prevent statutory nuisance, protect the health of residents, and minimise amenity impacts during construction. Consistent with IAQM and GLA guidance, the dust-control strategy prioritises prevention, followed by suppression, and finally containment.

Construction activities at Tangmere will be managed to avoid dust generation wherever practicable, supported by continuous monitoring and site-wide dust-control procedures.

Prevention

- Emphasise measures to prevent dust formation, as outlined in best practice guidance such as:
 - a) 'Best in Class' Guidance on Dust and Emissions from Construction (LLECP, March 2019).
 - b) *Guidance on the assessment of dust from demolition and construction* (January 2024 – v2.2) (IAQM).
 - c) HSE – Construction Dust - Construction Information Sheet No 36 (Revision 3).

The Principal Contractor will implement techniques and practices to minimise dust generation and reduce the potential for airborne emissions and nuisance, with particular focus on:

- Removal of existing hardstanding, concrete break-out and site preparation.
- Excavation for the temporary haul road, drainage and foundation works.
- Handling of aggregates, concrete, brick, insulation boards and cementitious materials in a constrained estate setting.
- Cutting, chasing or surface preparation for superstructure and façade works.
- General construction traffic on paved and unpaved surfaces.

Suppression

- Water-based suppression (misting hoses, spray bars, dampening of workfaces) will be employed during dusty activities, especially demolition, breaking out of hardstanding and cutting of masonry.
- Where cutting or grinding of concrete, brickwork or blockwork is unavoidable, equipment with integrated water suppression or local exhaust ventilation will be used.
- During prolonged dry or windy conditions, water suppression will be intensified, and particularly dusty operations may be postponed if necessary.

Containment

Effective measures will be implemented to prevent dust from leaving the construction site boundary, including:

- Use of solid hoarding around the full site perimeter.
- Where scaffolding is present, application of debris netting or temporary sheeting to contain localised dust.
- Enclosed or fully sheeted skips for dusty wastes.
- Stockpiles kept to a minimum, compacted, dampened and covered where practicable.
- Avoidance of long-term external storage of friable materials.
- Sealed transport for loose materials and full sheeting of any load with dust potential.
- Maintenance of paved surfaces to prevent accumulation and off-site transfer of dust.

Mitigation Measures – Throughout Development	Implemented
Site Management	
The mitigation measures contained in this document will be implemented and adhered to on-site	✓
The name and contact details of the individual responsible for air quality and dust will be displayed on the site boundary with contact information. This display will also include the head office contact information.	✓
A site log will be maintained to record complaints and outcomes.	✓
Record and respond to all dust and air quality pollutant emissions complaints	✓
Carry out regular site inspections to monitor compliance with air quality and dust control procedures).	✓
Increase the frequency of site inspections when activities with a high potential to produce dust and emissions and dust are being carried out, or during prolonged dry or windy conditions.	✓
Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the logbook.	✓
Preparing and Maintaining the Site	
The site layout will be planned so that plant and dust-causing activities are located away as remote as practically possible from the residential receptors around the development's area.	✓
Erect solid screens or barriers around dust generating activities, at least as high as any stockpiles on site	✓
Keep site fencing, barriers and scaffolding clean using wet methods.	✓
Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.	✓
Prevent site runoff of water or mud.	✓
Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.	✓
Remove materials from site as soon as possible.	✓
Cover, seed, or fence stockpiles to prevent wind whipping.	✓
Operating Vehicle/Machinery and Sustainable Travel	
Ensure all non-road mobile machinery comply with the standards set within this guidance.	✓
Ensure all vehicles switch off engines when stationary – no idling vehicles	✓
Operations	
Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible).	✓
Waste Management	
Prohibit bonfires and burning of waste materials.	✓
Reuse and recycle waste to reduce dust from waste materials	✓

11 CLP - Dust Monitoring – Scheme Proposals

To monitor the formation of dust emissions from the site, the following dust monitoring activities will take place:

- Real-time automatic PM₁₀ monitors shall be installed to ensure dust emissions are kept to acceptable levels.
- Handheld monitoring will be conducted if high-dust generation works take part on-site away from the automatic monitors.
- Daily and weekly visual inspections will be undertaken, focusing on the nearest sensitive receptors.

Dust monitoring will be focused on locations where people live or regularly pass close to the works, namely:

- Residential buildings on Willan Road and Gloucester Road, including Rochford, Stapleford and Lympe blocks.
- The Willan Road frontage and temporary haul road approach, where pedestrian movement is highest.

Monitoring outputs will be used to:

- Trigger additional mitigation when required.
- Provide evidence of compliance to the London Borough of Haringey.
- Inform any necessary adjustments to working methods or programme.

11.1 Air Quality Monitoring and Locations

PM₁₀ emissions will be continuously monitored using two real-time automatic monitors. To keep the system proportionate yet effective, these will be positioned to capture emissions towards both the estate and the public highway.

Proposed locations are:

Monitor D1 – Willan Road Frontage (Public Pedestrian Route)

Mounted on the hoarding or scaffold along the Willan Road boundary, approximately 2.5–3 m above ground level, facing toward the road and the footway used by residents, school children and pedestrians moving between blocks.

This location captures emissions from:

- Haul road vehicle access.
- Substructure and superstructure works near the frontage.
- Façade operations and crane lifts.
- Dust potentially dispersing towards public footways and play areas.

Monitor D2 – Estate-Facing Boundary (Rochford / Stapleford / Lympe Blocks)

Mounted at the northern or eastern boundary of the site, also at 2.5–3 m height, directed towards Rochford House, Lympe House and Stapleford block, which contain the closest residential receptors.

This location captures emissions from:

- Groundworks and concrete pours.
- Brickwork, façade installations and external envelope works.
- General site dust migrating toward homes.
- Vehicle traffic exiting on Gloucester Road.

Monitoring will be carried out in accordance with IAQM site-monitoring guidance and reviewed periodically to ensure appropriate receptor coverage. Should access constraints or receptor changes require relocation of monitors, a request will be submitted to the Local Planning Authority for written approval.

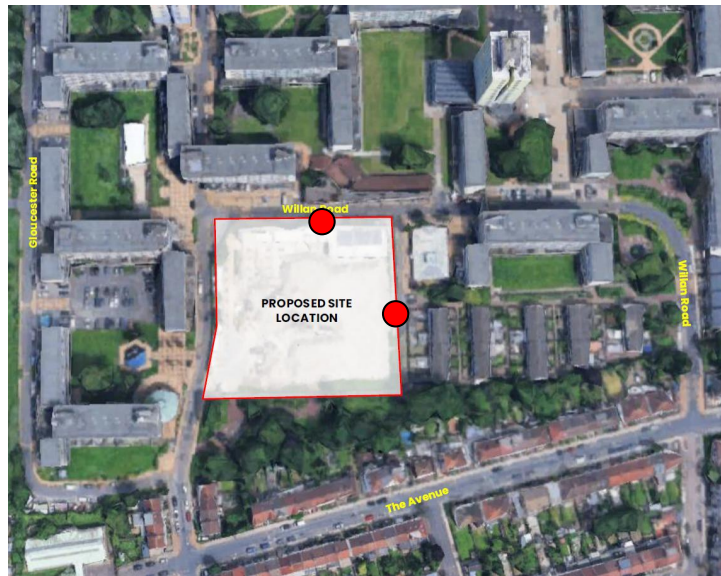


Figure 10.1: Dust Monitor Locations

11.2 Site Alert Levels

The IAQM guidance recommends a trigger alert level of $190 \mu\text{g}/\text{m}^3$ is set as an hourly mean for concentrations of PM_{10} close to demolition and construction sites. Internal amber PM_{10} alerts shall be set at $150 \mu\text{g}/\text{m}^3$ (hourly mean). Action in the event an alert occurs is as follows:

- **Amber** ($150 \mu\text{g}/\text{m}^3$) alert – site manager or other site staff to review activities to identify any potential dust or particulate sources and if cause of alert relates to a site activity, mitigation will be put in place immediately to reduce impacts
- **Red** ($190 \mu\text{g}/\text{m}^3$) alert – site manager or other appropriate person to review activities to identify any potential dust or particulate sources
 - a) if cause of alert relates to a site activity, mitigation will be put in place immediately to reduce impacts
 - b) if the mitigation is identified as insufficient then activities causing the elevated dust / particulate levels will cease

Should the site action level be exceeded; automatic alerts shall be sent via email and/or text message to nominated individuals. The alerts will include the following information:

- the location of the exceedance.
- the time of the exceedance; and,
- the recorded PM_{10} concentration.

The Site Manager shall investigate all alerts within 15 minutes, record findings, and confirm mitigation measures taken. Monthly formal dust monitoring reports will be issued.

Please note that exceedances may occasionally be caused by unrelated events (e.g. regional dust storms). Where mitigation is confirmed and ongoing, works may resume while monitoring continues.

11.3 Dust Monitoring – Daily and Weekly Visual Inspections

As well as the automatic monitoring, to minimise the formation of dust and harmful emissions from the site, the following additional dust monitoring activities will take place:

- Handheld dust monitoring will be conducted if high-dust generation works take part on-site in windy conditions.
- Weekly visual inspections with the nearest sensitive off-site receptors located within 50m of the site.

Visual Inspection – Sample Inspection Tick Sheet

Week Commencing:							
Inspected Items	Frequency	Mon	Tue	Wed	Thu	Fri	Sat
<i>Person completing the checklist</i>	<i>Initials</i>						
Dust being controlled correctly by personnel	Daily						
Visual inspection of mud/debris on haul routes	Daily						
Visual inspection of dust soiling on local receptors	Daily						
Visual observation of dust generation from works	Daily						
Wind direction checked	Daily						
Wind speed checked	Daily						
Weather forecast checked	Daily						

11.4 General Best Practice Tips

General

- No dry sweeping of large areas will be allowed.
- Public roads and access routes will be kept clean.
- No burning of waste materials will take place on site.
- All dust control equipment will be maintained in good condition.
- All vehicles carrying loose or potentially dusty material will be fully sheeted.
- Sand and other aggregates will be stored in bunded areas.
- Material stockpiles will be sheeted, sealed, or damped down.

12 CMS - Noise & Vibration Emissions Control Measures

12.1 Noise Emissions – Best Practical Means (BPM)

Noise emissions will be controlled in accordance with:

- BS 5228-1:2009+A1:2014, 'Code of practice for noise and vibration control on construction and open sites';
- CIRIA Environmental good practice on site.
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, Version 1.1, IAQM, October 2018.

The Principal Contractor shall ensure all site personnel receive induction and toolbox talks covering noise protocols. BPM measures shall include:

- Proper use and maintenance of equipment;
- Strategic siting of plant away from receptors;
- Avoidance of unnecessary noise (e.g. radios, shouting);
- Engine idling minimisation;
- Manual handling practices to reduce drop noise;
- Prohibition of site generators or standalone compressors.

12.2 Noise Emissions - Plant

In the appendices, a list of potential plant to be used on site with their appropriate noise levels have been produced. Based on these, the noise falls within acceptable limits and are not considered to be cause for potential disruption to neighbouring properties amenity.

12.3 Noise Monitoring

Noise levels will be monitored on-site according to the methods set out in BS 5228. All measurements shall be made on a sound level meter complying with BS EN 61672: 2003. Class 1 Meters are preferred wherever possible.

Trigger and action levels will be based on:

- 1-Hour LAeq Trigger and Action level
- 10- Hour LAeq. Action level (5-hours LAeq for Saturday Working)
- Shorter duration triggers and action levels may be appropriate on a case-by-case basis.

Proposed Development Trigger and Action Levels

For this development, proposed warning (trigger) and action levels are:

- Trigger: 60 dB LAeq (10 hours)
- Action: 65 dB LAeq (10 hours)

Noise Alerts

Alerts should also be set to a level 5dB(A) below the noise limits so that likely daily exceedances can be addressed before they occur. Text message and email alerts will be set up at the guidance values to be received by the site manager, the

monitoring personnel, and any other relevant party. In the instance that the noise limits are exceeded, works should be halted and the reason for exceedance determined and remedied before works commence again.

If noise levels exceed agreed thresholds, immediate mitigation measures will be implemented. These may include adjustments to work schedules, additional noise barriers, or alternative construction methods to reduce impacts. All noise monitoring data will be logged, stored securely, and a monthly report will be issued of the Noise Monitoring levels. Findings and instances of exceedances will be reported, including actions taken.

Monitor Locations

To keep monitoring proportionate but effective, one primary continuous noise monitor is proposed, co-located with a vibration sensor at the most sensitive residential boundary.

Monitor NVM1 – Estate-facing boundary

NVM1 will be positioned on the northern or north-eastern boundary of the Tangmere site, mounted at around 3 m above ground level on hoarding or scaffold, facing towards the nearest residential apartments (for example Rochford, Lypne or Stapleford blocks). This location is selected to capture the worst-case exposure from piling, superstructure and external works affecting Broadwater Farm residents.

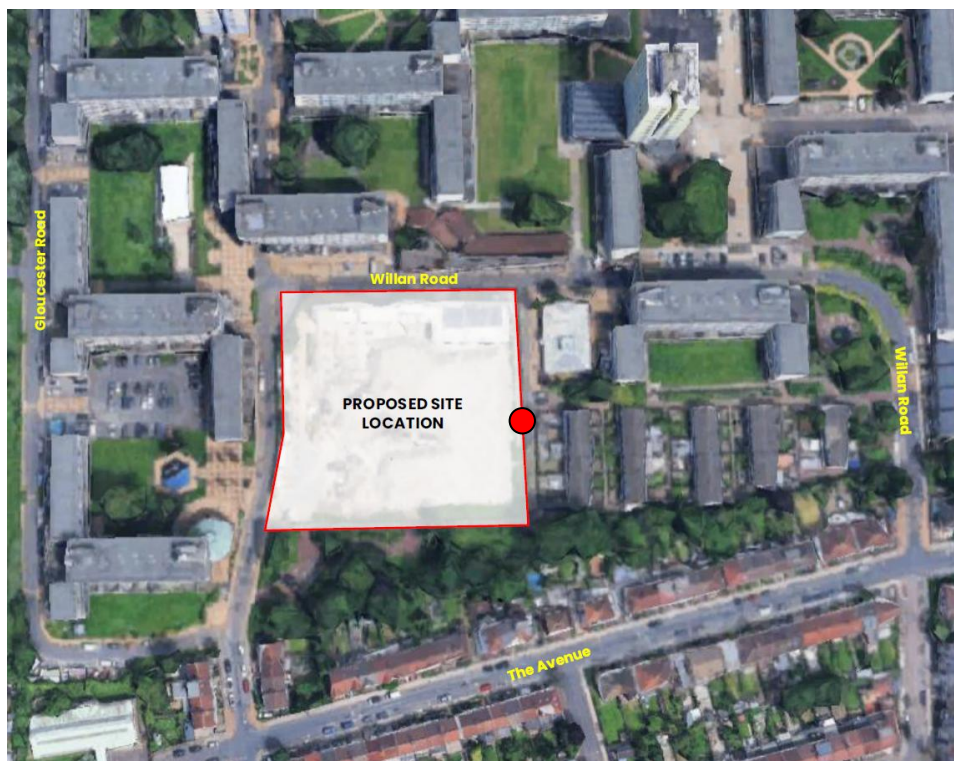


Figure 11.1: Noise & Vibration Monitoring Locations

12.4 Vibration Emissions

Construction Vibration Assessment

Vibration shall be controlled in accordance with BS 5228-2:2009, considering:

1. The distance to vibration sensitive receptors.
2. Duration of site operations.
3. Hours of work.
4. Potential for building or decorative damage.

At Tangmere, the highest vibration risks arise from:

- Piling works
- Use of heavy compaction plant.
- Localised breaking out of existing hardstanding or concrete.

These activities will be carefully managed to prevent adverse impacts on neighbouring dwellings.

12.5 Vibration Monitoring

Vibration will be monitored at NV1, co-located with the continuous noise monitor, using a tri-axial geophone or equivalent sensor mounted on a rigid fix adjacent to the nearest residential block. Thresholds will be set in accordance with BS 5228-2 and BS 7385-2.

Threshold (PPV in mm/s)	Relevant Standard	Applicability
1 mm/s (Cautionary Limit)	BS 5228-2:2009+A1:2014 (Vibration Control for Construction)	- Human perception threshold and comfort; used as an early warning level.
3 mm/s (Structural Limit)	BS 7385-2:1993 (Evaluation & Measurement for Vibration in Buildings)	- Threshold for risk of cosmetic damage (minor cracking) in typical residential buildings.
Table 11.1: Comparison of Vibration Standards		

Alerts will be triggered if PPV thresholds are breached, prompting review and potential suspension of works until corrective measures are applied.

Monthly vibration logs will be maintained, and monthly summary reports issued, detailing:

- Time and duration of each vibration event.
- Magnitude of vibration (PPV).
- Comparison to threshold limits.
- Correlation with demolition activity.

13 CMS - Site Waste Management

A full Site Waste Management Plan (SWMP) will be produced for the construction stage. This document will set targets for waste re-use, recycling, and disposal, expressed as a percentage. The contractor will oversee waste management on-site and keep detailed records of waste specifics. Waste Carriers will submit monthly reports, which will detail:

- European Waste Code (EWC)
- Waste description
- Weight in tonnes
- Percentage of waste recycled

Information on the waste carriers responsible for non-hazardous and hazardous waste will be documented, including their Waste Management Licence number and/or Pollution Prevention and Control Permit Number, where applicable.

Waste management performance for the project will be monitored with the following to be undertaken and targets set

- A comparison of set waste management targets versus actual outcomes including monthly analysis.
- Achieve at least 95% diversion of construction waste from landfill.
- An aim to keep construction waste below 4.5 tonnes per 100m² of Gross Internal Floor Area (GIFA).

There are no materials on-site for re-use.

All on-site activities will follow the waste hierarchy:



Formation will follow the hierarchy & ensure the project complies with waste management best practices and will:

- Identify types and amounts of waste the project will generate.
- Segregate non-hazardous and hazardous waste for recycling & safe disposal.
- Reuse materials on-site wherever possible.
- Appoint a "waste champion" on-site, to oversee waste management practices and communicate the waste strategy.
- Keep copies of all hazardous waste consignment notes and duty of care waste transfer notes on-site for review.

Due to changing site logistics and space constraints throughout the phased development, permanent waste compactors are not currently proposed. Waste will instead be managed through segregated skips, enclosed bins and regular licensed collections.

Reverse logistics measures will be implemented where practicable, including supplier collection of pallets, stillages and packaging to minimise unnecessary vehicle movements and reduce waste generation.

14 CLP - Implementing, Monitoring and Updating

This document will be monitored and managed by Formation Design & Build. Details of the Construction Manager (CLMP Manager) for the scheme have been provided on Page 2.

At this stage of the project, post planning permission but prior to the commencement of on-site activities, this document is considered a detailed CLMP. It has been written in line with TfL guidance and in their format. Furthermore, the requirements of any planning conditions, the policies and documents of the main contractor, and any requirements from various departments within the local authority, such as highways and environment, have been integrated. Appropriate contact details for the site, such as the site manager, will be present on all site entrances on a site notice board.

14.1 CLMP Manager

A CLMP Manager has been appointed prior to construction starting. They will take responsibility for the day-to-day management and will be the first point of contact for site issues. It is also the coordinator's role to oversee the effectiveness of the document and prepare regular updates to the planning authority when requested.

The CLMP Manager will respond to any questions or queries about the development and any mitigation measures put in place to resolve traffic issues connected with the construction work. This may include:

- Reminding the contractor and subcontractors about designated routes to and from the site;
- Checking vehicles arriving at site to make sure they meet the contractor's safety requirements; and
- Managing the delivery booking and scheduling tool that records deliveries.

14.2 Review and Notification

This document has also been written to prevent, reduce, and mitigate potential significant impacts and effects of the construction of the proposed development by setting out the management measures that will be employed. It has considered the likely construction activity resulting from the development and construction vehicle access to the site on local roads in the context of existing layouts and on-street parking provision.

The CLMP should be reviewed every six months for the duration of the construction programme, and any issues or changes that may need to be made should be discussed with the relevant parties to agree.

14.3 Monitoring and Reporting

In line with the planning permission, monitoring of the approved document will take place. The following documents will be prepared, should required by the local authority during the course of the scheme.

- FORS Silver accreditation certificate for suppliers.
- Vehicle routing tracking.
- Traffic Marshal and Banksman accreditations.
- Waste management plan.
- Staff travel plan handbook.
- CLOCS Audit report.

14.4 Mitigation Measures

Suitable mitigation measures have been identified throughout this CLMP and will be implemented for the duration of the construction programme to reduce the impact of the works on the public highway and surrounding area. These measures are intended to ensure the safe and efficient operation of the local highway network while protecting all road users, including pedestrians, cyclists, wheelchair users, mobility impaired persons and vehicular traffic.

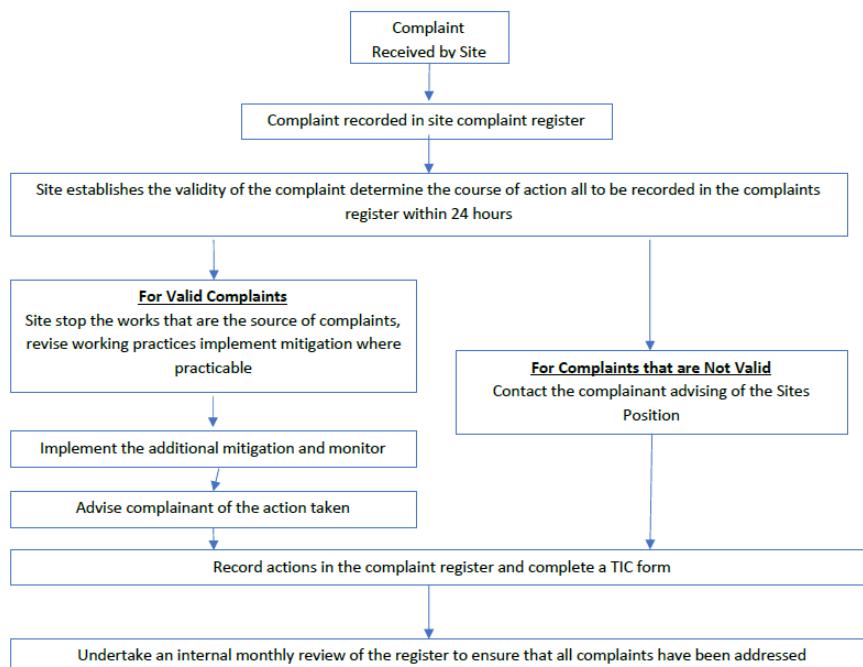
Mitigation measures include:

- A managed delivery booking system coordinated by the Site Manager.
- Use of a temporary haul road and controlled holding area to prevent vehicle stacking on surrounding estate roads.
- Traffic marshals and trained banksmen controlling all construction vehicle movements.
- Low-speed vehicle movements throughout the site and haul route.
- Segregated pedestrian routes and controlled crossing points.
- Cyclist warning signage and vulnerable road user protection measures in accordance with CLOCS and FORS principles.
- Delivery scheduling to avoid peak traffic periods and school drop-off/pick-up times wherever reasonably practicable.
- Just-in-time deliveries and consolidation of deliveries where practicable.
- Wheel washing, road sweeping and dust suppression measures to maintain highway cleanliness.
- Strict no-idling procedures for all construction vehicles and plant.
- Continuous monitoring and review of logistics operations throughout the programme.

Measures have also been outlined to minimise impacts on local residents, neighbouring properties and nearby businesses, including controls relating to noise, dust, vibration, working hours and communication procedures.

Subject to the mitigation measures outlined within this report, the construction works associated with the development are not anticipated to result in any significant adverse impact on the surrounding highway network, pedestrians, cyclists, local businesses or residential amenity.

14.5 Complaints Process



Appendix 1

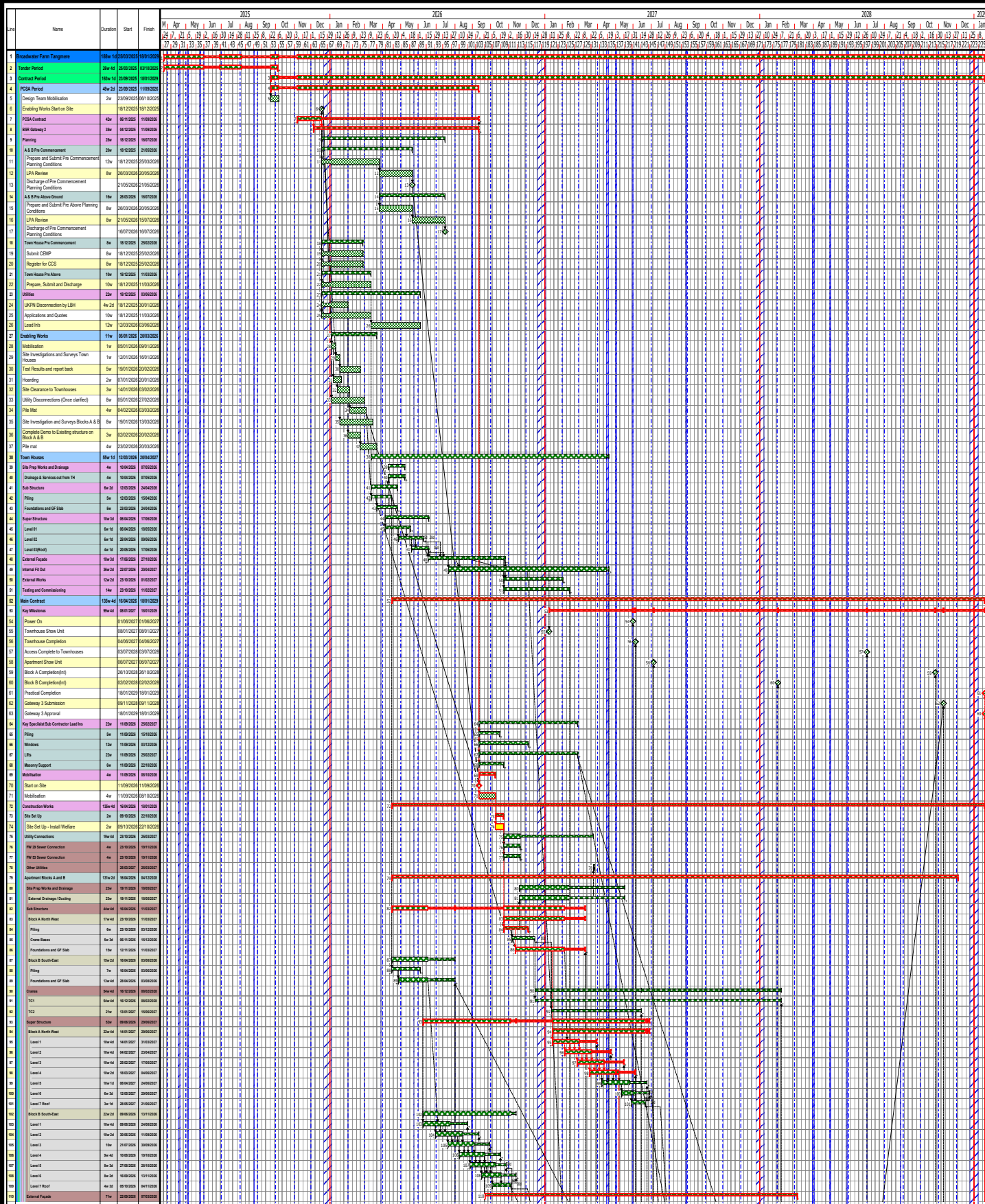


Contract Programme - Enabling Works & Town Houses

London Borough of Haringey

Mark O Dwyer

12/12/2025

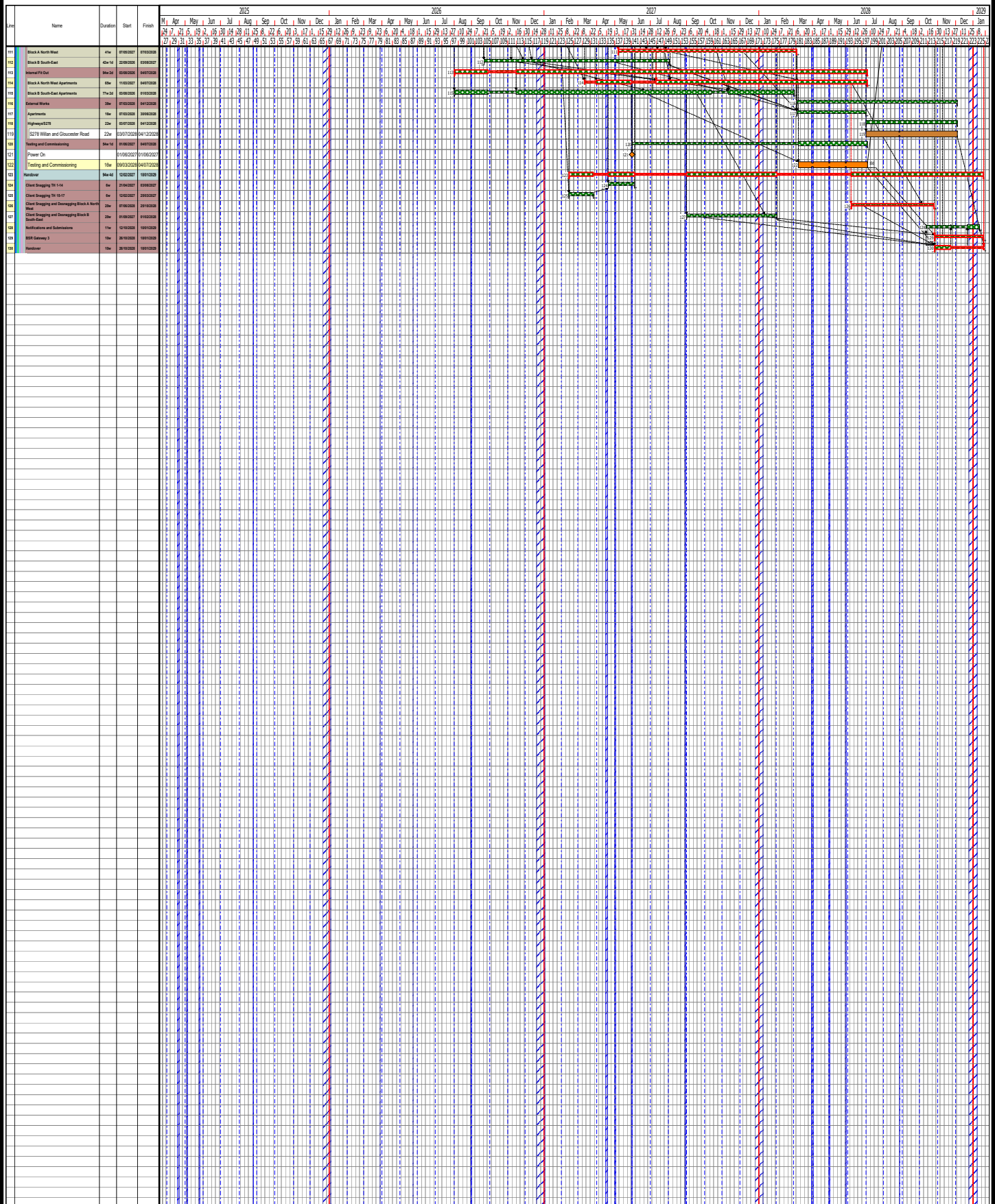


Drawn by: Mark O Dwyer

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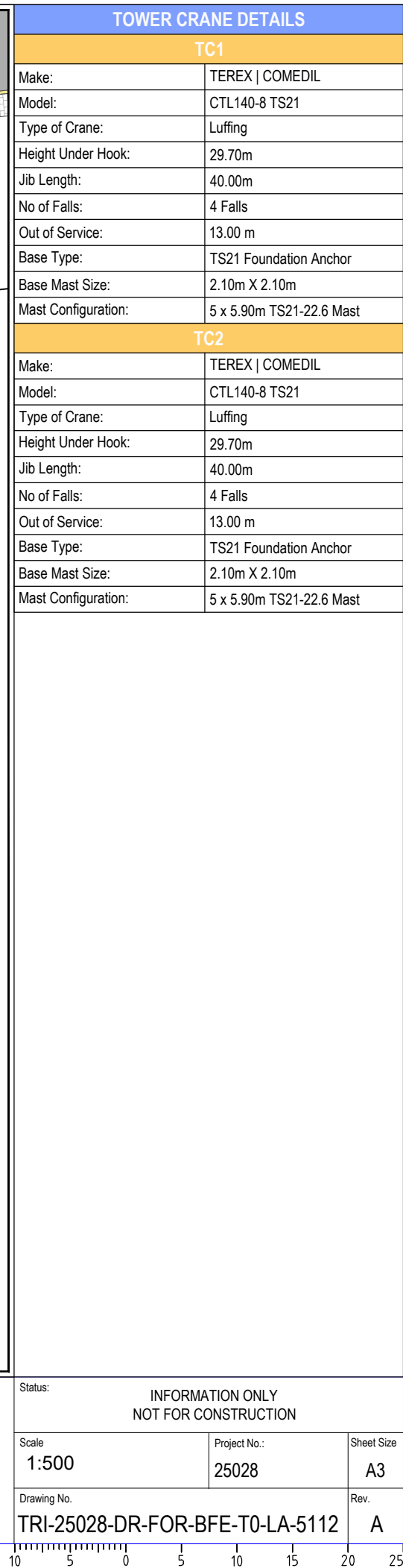
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Appendix 2



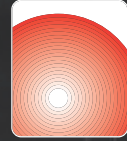


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Appendix 3



select surveys



Willan Road, Tottenham Detailed Unexploded

Ordnance (UXO) Risk Assessment

Client: Karakusevic Carson Architects

Date: 27/11/2020

T 08444 787 839 | www.selectsurveys.com



Executive Summary

Site Location and Description

The site is located in the West Green area of Tottenham, within the London Borough of Haringey. It is situated across the Broadwater Farm Estate.

The site is split into four distinct sections and for the purpose of this report these have been labelled as Section A, Section B, Section C and Section D (see **Annex C**).

Section A is the northernmost section of the site with Section D being the southernmost section of the site. The site is bordered in all directions by various residential houses and flats as well as several streets and areas of open vegetated and hardstanding ground.

Section A is occupied by a joint cycle and pedestrian access way and open, vegetated ground. Section B is occupied by structures formerly associated with Moselle School, open hardstanding ground and a section of open, vegetated ground. Section C is occupied by several multi-storey residential structures directly associated with the Broadwater Farm Estate and the Broadwater Farm Community Centre, a section of a roadway and areas of open vegetated and hardstanding ground. Section D is occupied by Broadwater Lodge (comprising two adjoining complexes of housing association structures) and areas of open vegetated and hardstanding ground.

The site is approximately centred on the OS grid reference: **TQ3298690150**.

Proposed Works

The exact scope of the proposed works was not known at the time of writing this report. It is understood however that the works will include the refurbishment of existing homes on the Broadwater Farm Estate and the development of new homes, amongst other developments.

Geology and Bomb Penetration Depth

The British Geological Survey (BGS) map shows the site to be underlain by London Clay Formation- Clay, Silt and Sand. This underlying bedrock was formed in the Palaeogene Period.

Site specific geotechnical information was not available to 1st Line Defence at the time of the production of this report. An assessment of maximum bomb penetration depth can be made once such data becomes available, or by a UXO specialist during on-site support.

It should be noted that the maximum depth that a bomb could reach may vary across a site and will be largely dependent on the specific underlying geological strata and its density.

UXO Risk Assessment

1st Line Defence has assessed that there is a **Medium Risk** from items of German aerial delivered UXO and unexploded anti-aircraft projectiles across Section B, Section C and the northern area of Section D. There is an assessed **Low-Medium Risk** from items of German aerial delivered UXO and unexploded anti-aircraft projectiles across Section A and the southern area of Section D (see **Annex C** for annotated aerial imagery showing the sections). There is an overall **Low Risk** from all other types of items of Allied UXO across the site.

This assessment is based on the following factors:

German Risk:

- During WWII the site was located in the Municipal Borough of Tottenham which was subjected to an overall high density of bombing, with an average of 103.9 bombs recorded per 1,000 acres according to official Home Office statistics.
- London Bomb Census mapping records two bombs directly on Section C and two additional bombs adjacent. The type of bomb was not specified in this mapping. Incendiary bombing is also recorded over Section C and D in weekly London Bomb Census mapping. Local bomb mapping for Tottenham records three H.E bombs to have fallen within Section C, which is roughly consistent with the London Bomb Census mapping. The map also records one unexploded H.E bomb on the boundaries of Section B and Section C. The local written records corroborate these incidences.
- Middlesex and Haringey Bomb damage maps were consulted. Whilst neither of these recorded damage on site, there were no structures present on site during wartime for damage to be attributed to. Post-WWII aerial photography does not appear to show obvious signs of damage. However, this photography is either incomplete or of a low

**UXO Risk Assessment**

resolution. In addition, given that the majority of all sections of the site were occupied either by allotment gardens or areas of open vegetated land, it is possible that signs of a UXB may have been concealed by such ground conditions.

- The ground cover across the majority of the site would therefore not have been conducive to the easy observation of evidence of UXO. Open ground and allotment gardens are liable to grow and shift that can obscure potential entry holes, especially as the entry hole for a 50kg H.E bomb could be as small as 20cm in diameter.
- As the site was occupied by open ground, allotment gardens and a section of a river it seems likely that access would generally have been either infrequent (to the areas of open ground and the river) or sporadic (to the areas of allotment gardens). The access would also likely have been lowered following the incidences of bombing that occurred in Section C and close proximity to Section B.
- However, it is anticipated that sections of the site that were situated immediately adjoining sections of surrounding roadway and housing, such as Section A and the southern section of Section D, would have been subject to a higher degree of monitor. Any evidence of UXO on site is therefore most likely to have been spotted in these areas.
- Overall, given the above factors, Section A and the south area of Section D, which were situated at a distance from recorded bomb strikes and closer to adjoining wartime roadways/housing have been assessed as **Low-Medium Risk**. (These areas were still occupied by allotment gardens and in the general vicinity of bombing, so could not be assessed 'Low Risk'). Section B, Section C and the northern area of Section D, which were situated on or nearer to bomb strikes and generally further away from roadways/housing, have been assessed as **Medium Risk**. See **Annex U** for a risk map of the site.

Allied Risk:

- There is no evidence that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA. The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding aerial delivered ordnance.

Post-WWII Development:

- Significant development has occurred across the site since WWII. The main development has been the construction of the Broadwater Farm Estate which occupies the majority of Section C. Sections B and D have also seen the construction of several structures whilst Section A has seen the least development, which is limited to the construction of a cycle and access pathway.
- The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site. Within the footprints of post-WWII redevelopments, the risk from shallow-buried UXO (especially 1kg German incendiaries and British AA projectiles) should have been encountered/removed during initial excavations. However, the risk from deep-buried German UXBs will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

Recommended Risk Mitigation Measures

The following risk mitigation measures are recommended to support the proposed works at the Willan Road, Tottenham site:

All Works

- UXO Risk Management Plan
- Site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

Medium Risk Areas**Open Intrusive Works (trial pits, service pits, open excavations, shallow foundations etc.)**

- UXO Specialist On-site Support

Boreholes and Piled Foundations

- Intrusive Magnetometer Survey of all borehole and pile locations/clusters down to maximum bomb penetration depth.



Risk Map (German Aerial Delivered UXO)



For indicative purposes – not to scale.

Please note that this assessed risk map may not take into account all post-war redevelopment/excavations on site.



Low-Medium Risk



Medium Risk

1st Line Defence Risk Mitigation Services:

All Areas of the Site:

- Site Specific Unexploded Ordnance Awareness Briefings – a service recommended to all personnel conducting intrusive works.
- UXO Risk Management Plan

Medium Risk Areas of the site:

- Unexploded Ordnance Specialist - a service to support open intrusive works.
- Intrusive Magnetometer Survey – a service to support any borehole or pile locations/clusters down to an assessed maximum bomb penetration depth.

Glossary

Abbreviation	Definition
AA	Anti-Aircraft
AFS	Auxiliary Fire Service
AP	Anti-Personnel
ARP	Air Raid Precautions
DA	Delay-action
EOC	Explosive Ordnance Clearance
EOD	Explosive Ordnance Disposal
FP	Fire Pot
GM	G Mine (Parachute mine)
HAA	Heavy Anti-Aircraft
HE	High Explosive
IB	Incendiary Bomb
JSEODOC	Joint Services Explosive Ordnance Disposal Operation Centre
LAA	Light Anti-Aircraft
LCC	London County Council
LRRB	Long Range Rocket Bomb (V-2)
LSA	Land Service Ammunition
NFF	National Filling Factory
OB	Oil Bomb
PAC	Pilotless Aircraft (V-1)
PB	Phosphorous Bomb
PM	Parachute Mine
POW	Prisoner Of War
RAF	Royal Air Force
RCAF	Royal Canadian Air Force
RFC	Royal Flying Corps
RNAS	Royal Naval Air Service
ROF	Royal Ordnance Factory
SA	Small Arms
SAA	Small Arms Ammunition
SD2	Anti-personnel "Butterfly Bomb"
SIP	Self-Igniting Phosphorous
U/C	Unclassified bomb
UP	Unrotated Projectile (rocket)
USAAF	United States Army Air Force
UX	Unexploded
UXAA	Unexploded Anti-Aircraft
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	Flying Bomb (Doodlebug)
V-2	Long Range Rocket
WAAF	Women's Auxiliary Air Force
X	Exploded



Contents

Executive Summary	II
Glossary	V
Contents.....	VI
Annexes	VIII
1. Introduction	1
1.1. Background.....	1
2. Method Statement	1
2.1. Report Objectives.....	1
2.2. Risk Assessment Process.....	1
2.3. Sources of Information	1
3. Background to Bombing Records.....	2
3.1. General Considerations of Historical Research	2
3.2. German Bombing Records	2
3.3. Allied Records	2
4. UK Regulatory Environment and Guidelines	3
4.1. General	3
4.2. CDM Regulations 2015	3
4.3. The 1974 Health and Safety at Work etc. Act.....	3
4.4. CIRIA C681	3
4.5. Additional Legislation	4
5. The Role of Commercial UXO Contractors and The Authorities	4
5.1. Commercial UXO Specialists	4
5.2. The Authorities	4
6. The Site	5
6.1. Site Location	5
6.2. Site Description.....	5
7. Scope of the Proposed Works.....	5
7.1. General	5
8. Ground Conditions	6
8.1. General Geology	6
8.2. Site Specific Geology.....	6
9. Site History	6
9.1. Introduction	6
9.2. Ordnance Survey Historical Maps.....	7
9.3. Historical Photography of the Site	7
10. Introduction to German Aerial Delivered Ordnance	8
10.1. General	8
10.2. Generic Types of WWII German Aerial Delivered Ordnance.....	8
10.3. Failure Rate of German Aerial Delivered Ordnance.....	9
10.4. UXB Ground Penetration	9
10.4.1. The J-Curve Effect	9
10.4.2. WWII UXB Ground Penetration Studies	9



10.4.3.	Site Specific Bomb Penetration Considerations	10
10.5.	V-Weapons	10
11.	The Likelihood of Contamination from German Aerial Delivered UXBs	11
11.1.	World War I	11
11.2.	World War II Bombing of Tottenham	11
11.3.	WWII Home Office Bombing Statistics	12
11.4.	London Civil Defence Region Bomb Census Maps	12
11.6.	Air Raid Incident Records.....	13
11.7.	Middlesex County Council War Damage Map	14
11.9.	WWII-Era Aerial Photography	14
11.10.	Abandoned Bombs.....	15
11.11.	Bomb Disposal Tasks	15
11.12.	Evaluation of German Aerial Delivered UXO Records.....	16
12.	Introduction to Allied Explosive Ordnance	18
12.1.	General	18
12.2.	Defending the UK From Aerial Attack.....	18
12.2.1.	Anti-Aircraft Artillery (AAA).....	19
13.	The Likelihood of Contamination from Allied Ordnance	20
13.1.	Introduction	20
13.2.	Evaluation of Contamination Risk from Allied UXO	20
14.	The Likelihood of UXO Contamination Summary	21
15.	The Likelihood that UXO Remains	22
15.1.	Introduction	22
15.2.	UXO Clearance	22
15.3.	Post-War Redevelopment.....	23
16.	The Likelihood of UXO Encounter	23
16.1.	Introduction	23
16.2.	Encountering Aerial Delivered Ordnance.....	23
16.3.	Land Service/Small Arms Ammunition Encounter	Error! Bookmark not defined.
17.	The Likelihood of UXO Initiation	24
17.1.	Introduction	24
17.2.	Initiating Aerial Delivered Ordnance	24
18.	Consequences of Initiation/Encounter	25
18.1.	Introduction	25
18.2.	Consequences of Detonation	25
19.	1st Line Defence Risk Assessment	26
19.1.	Risk Assessment Stages	26
19.2.	Assessed Risk Level	26
20.	Proposed Risk Mitigation Methodology	28
20.1.	General	28
	Bibliography	29



Annexes

List of Report Annexes	
Annex A	Site Location Maps
Annex B	Recent Aerial Photography
Annex C	Annotated Aerial Photography
Annex D	Client Provided Site Plan
Annex E	Pre and Post-WWII Historical Maps
Annex F	Pre-WWII Photography
Annex G	Examples of German Aerial Delivered Ordnance
Annex H	Example of UXO Entry Holes / The 'J-curve' Effect Principle
Annex I	Examples of UXO Incidents
Annex J	WWI Map of Air Raids and Naval Bombardments
Annex K	WWI London Bomb Mapping
Annex L	London WWII Bomb Density Map
Annex M	Luftwaffe Reconnaissance Imagery
Annex N	London Bomb Census Mapping
Annex O	London V-1 Flying Bomb Map
Annex P	Tottenham Air Raid Precautions Bomb Map
Annex Q	Air Raid Incident Records
Annex R	Middlesex County Council Bomb Damage Map
Annex S	Post-WWII Aerial Photography
Annex T	Examples of Anti-Aircraft Projectiles
Annex U	Risk Mapping of the Site

1st Line Defence Limited

Detailed Unexploded Ordnance (UXO) Risk Assessment

Site: Willan Road, Tottenham
Client: Select Surveys Ltd.

1. Introduction

1.1. Background

1st Line Defence has been commissioned by Select Surveys Ltd. to conduct a Detailed Unexploded Ordnance (UXO) Risk Assessment for the works proposed at the Willan Road, Tottenham site.

Buried UXO can present a significant risk to construction works and development projects. The discovery of a suspect device during works can cause considerable disruption to operations as well as cause unwanted delays and expense.

UXO in the UK can originate from three principal sources:

1. Munitions resulting from wartime activities including German bombing in WWI and WWII, long range shelling, and defensive activities.
2. Munitions deposited as a result of military training and exercises.
3. Munitions lost, burnt, buried or otherwise discarded either deliberately, accidentally, or ineffectively.

This report will assess the potential factors that may contribute to the risk of UXO contamination. If an elevated risk is identified at the site, this report will recommend appropriate mitigation measures, in order to reduce the risk to as low as is reasonably practicable. Detailed analysis and evidence will be provided to ensure an understanding of the basis for the assessed risk level and any recommendations.

This report complies with the guidelines outlined in *CIRIA C681*, 'Unexploded Ordnance (UXO) A Guide for the Construction Industry.'

2. Method Statement

2.1. Report Objectives

The aim of this report is to conduct a comprehensive assessment of the potential risk from UXO at the Willan Road site, Tottenham. The report will also recommend appropriate site and work-specific risk mitigation measures to reduce the risk from explosive ordnance during the envisaged works to a level that is as low as reasonably practicable.

2.2. Risk Assessment Process

1st Line Defence has undertaken a five-step process for assessing the risk of UXO contamination:

1. The likelihood that the site was contaminated with UXO.
2. The likelihood that UXO remains on the site.
3. The likelihood that UXO may be encountered during the proposed works.
4. The likelihood that UXO may be initiated.
5. The consequences of initiating or encountering UXO.

In order to address the above, 1st Line Defence has taken into consideration the following factors:

- Evidence of WWI and WWII German aerial delivered bombing as well as the legacy of Allied occupation.
- The nature and conditions of the site during WWII.
- The extent of post-war development and UXO clearance operations on site.
- The scope and nature of the proposed works and the maximum assessed bomb penetration depth.
- The nature of ordnance that may have contaminated the proposed site area.

2.3. Sources of Information

Every reasonable effort has been made to ensure that relevant evidence has been consulted and presented in order to produce a thorough and comprehensible report for the client. To achieve this the following, which includes military records and archive material held in the public domain, have been accessed:

- The National Archives and Haringey Archives.
- Historical mapping datasets.
- Historic England National Monuments Record.
- Relevant information supplied by Select Surveys Ltd.
- Available material from 33 Engineer Regiment (EOD) Archive (now 28 Regt).
- 1st Line Defence's extensive historical archives, library and UXO geo-datasets.
- Open sources such as published books and internet resources.

Research involved a visit to The National Archives and Haringey Archives.

3. Background to Bombing Records

3.1. General Considerations of Historical Research

This desktop assessment is based largely upon analysis of historical evidence. Every reasonable effort has been made to locate and present significant and pertinent information. 1st Line Defence cannot be held accountable for any changes to the assessed risk level or risk mitigation measures, based on documentation or other data that may come to light at a later date, or which was not available to 1st Line Defence during the production of this report.

It is often problematic and sometimes impossible to verify the completeness and accuracy of WWII-era records. As a consequence, conclusions as to the exact location and nature of a UXO risk can rarely be quantified and are, to a degree, subjective. To counter this, a range of sources have been consulted, presented and analysed. The same methodology is applied to each report during the risk assessment process. 1st Line Defence cannot be held responsible for any inaccuracies or the incompleteness in available historical information.

3.2. German Bombing Records

During WWII, bombing records were generally gathered locally by the police, Air Raid Precaution (ARP) wardens and military personnel. These records typically contained information such as the date, the location, the amount of damage caused and the types of bombs that had fallen during an air raid. This information was made either through direct observation or post-raid surveys. The Ministry of Home Security Bomb Census Organisation would then receive this information, which was plotted onto maps, charts, and tracing sheets by regional technical officers. The collective record set (regional bomb census mapping and locally gathered incidents records) would then be processed and summarised into reports by the Ministry of Home Security Research and Experiments Branch. The latter were tasked with providing the government 'a complete picture of air raid patterns, types of weapons used and damage caused- in particular to strategic services and installations such as railways, shipyards, factories and public utilities.'¹

The quality, detail and nature of record keeping could vary considerably between provincial towns, boroughs and cities. No two areas identically collated or recorded data. While some local authorities maintained records with a methodical approach, sources in certain areas can be considerably more vague, dispersed, and narrower in scope. In addition, the immediate priority was mostly focused on assisting casualties and minimising damage at the time. As a result, some records can be incomplete and contradictory. Furthermore, many records were even damaged or destroyed in subsequent air raids. Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are therefore not always reliable. Whereas records of attacks on military or strategic targets were often maintained separately and have not always survived.

3.3. Allied Records

During WWII, considerable areas of land were requisitioned by the War Office for the purpose of defence, training, munitions production and the construction of airfields. Records relating to military features vary and some may remain censored. Within urban environments datasets will be consulted detailing the location of munition production as well as wartime air and land defences. In rural locations it may be possible to obtain plans of military establishments, such as airfields, as well as training logs, record books, plans and personal memoirs. As with bombing records, every reasonable effort will be made to access records of, and ascertain any evidence of, military land use. However, there are occasions where such evidence is not available, as records may not be accessible, have been lost/destroyed, or simply were not kept in the first place.

¹ <http://www.nationalarchives.gov.uk/help-with-your-research/research-guides/bomb-census-survey-records-1940-1945/>.

4. UK Regulatory Environment and Guidelines

4.1. General

There is no formal obligation requiring a UXO risk assessment to be undertaken for construction projects in the UK, nor is there any specific legislation stipulating the management or mitigation of UXO risk. However, it is implicit in the legislation outlined below that those responsible for intrusive works (archaeology, site investigation, drilling, piling, excavation etc.) should undertake a comprehensive and robust assessment of the potential risks to employees and that mitigation measures are implemented to address any identified hazards.

4.2. CDM Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM 2015) define the responsibilities of parties involved in the construction of temporary or permanent structures.

The CDM 2015 establishes a duty of care extending from clients, principle co-ordinators, designers, and contractors to those working on, or affected by, a project. Those responsible for construction projects may therefore be accountable for the personal or proprietary loss of third parties, if correct health and safety procedure has not been applied.

Although the CDM does not specifically reference UXO, the risk presented by such items is both within the scope and purpose of the legislation. It is therefore implied that there is an obligation for parties to:

- Provide an appropriate assessment of potential UXO risks at the site (or ensure such an assessment is completed by others).
- Put in place appropriate risk mitigation measures if necessary.
- Supply all parties with information relevant to the risks presented by the project.
- Ensure the preparation of a suitably robust emergency response plan.

4.3. The 1974 Health and Safety at Work etc. Act

All employers have a responsibility under the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, to ensure the health and safety of their employees and third parties, so far as is reasonably practicable and conduct suitable and sufficient risk assessments.

4.4. CIRIA C681

In 2009, the Construction Industry Research and Information Association (CIRIA) produced a guide to the risk posed by UXO to the UK construction industry (CIRIA C681). CIRIA is a neutral, independent and not-for-profit body, linking organisations with common interests and facilitating a range of collaborative activities that help improve the industry.

The publication provides the UK construction industry with a defined process for the management of risks associated with UXO from WWI and WWII aerial bombardment. It is also broadly applicable to the risks from other forms of UXO that might be encountered. It focuses on construction professionals' needs, particularly if there is a suspected item of UXO on site, and covers issues such as what to expect from a UXO specialist. The guidance also helps clients to fulfil their legal duty under CDM 2015 to provide designers and contractors with project specific health and safety information needed to identify hazards and risks associated with the design and construction work. This report conforms to

this CIRIA guidance and to the various recommendations for good practice referenced therein. It is recommended that this document is acquired and studied where possible to allow a better understanding of the background to both the risk assessment process and the UXO issue in the UK in general.

4.5. Additional Legislation

In the event of a casualty resulting from the failure of an employer/client to address the risks relating to UXO, the organisation may be criminally liable under the Corporate Manslaughter and Corporate Homicide Act 2007.

5. The Role of Commercial UXO Contractors and The Authorities

5.1. Commercial UXO Specialists

The role of a UXO Specialist (often referred to as UXO Consultant or UXO Contractor) such as 1st Line Defence, is defined in CIRIA C681 as the provision of expert knowledge and guidance to the client on the most appropriate and cost-effective approach to UXO risk management at a site.

The principal role of UXO Specialists is to provide the client with an appropriate assessment of the risk posed by UXO for a specific project, and identify and carry out suitable methodology for the mitigation of any identified risks to reduce them to an acceptable level.

The requirement for a UXO Specialist should ideally be identified in the initial stages of a project, and it is recommended that this occur prior to the start of any detailed design. This will enable the client to budget for expenditure that may be required to address the risks from UXO, and may enable the project team to identify appropriate techniques to eliminate or reduce potential risks through considered design, without the need for UXO specific mitigation measures. The UXO Specialist should have suitable qualifications, levels of competency and insurances.

Please note 1st Line Defence has the capability to provide a complete range of required UXO risk mitigation services, in order to reduce a risk to as low as reasonably practicable. This can involve the provision of both ground investigation, and where appropriate, UXO clearance services.

5.2. The Authorities

The police have a responsibility to co-ordinate the emergency services in the event of an ordnance-related incident at a construction site. Upon inspection they may impose a safety cordon, order an evacuation, and call the military authorities Joint Services Explosive Ordnance Disposal Operation Centre (JSEODOC) to arrange for investigation and/or disposal. Within the Metropolitan Police Operational Area, SO15 EOD will be tasked to any discovery of suspected UXO. The request for Explosive Officer (Expo) support is well understood and practiced by all Metropolitan Boroughs. The requirement for any additional assets will then be coordinated by the Expo if required.

In the absence of a UXO specialist, police officers will usually employ such precautionary safety measures, thereby causing works to cease, and possibly requiring the evacuation of neighbouring businesses and properties.

The priority given to the police request will depend on the EOD team's judgement of the nature of the UXO risk, the location, people and assets at risk, as well as the availability of resources. The speed of response varies; authorities may respond immediately or in some cases it may take several days for the item of ordnance to be dealt with. Depending on the on-site risk assessment the item of ordnance may be removed from the site and/or destroyed by a controlled explosion.

Following the removal of an item of UXO, the military authorities will only undertake further investigations or clearances in high-risk situations. If there are regular UXO finds on a site the JSEODOC may not treat each occurrence as an emergency and will recommend the construction company puts in place alternative procedures, such as the appointment of a commercial contractor to manage the situation.

6. The Site

6.1. Site Location

The site is located in the West Green area of Tottenham, within the London Borough of Haringey. It is situated across the Broadwater Farm Estate.

The site is split into four distinct sections and for the purpose of this report these have been labelled as Section A, Section B, Section C and Section D (see **Annex C**).

Section A is the northernmost section of the site with Section D being the southernmost section of the site. The site is bordered in all directions by various residential houses and flats as well as several streets and areas of open vegetated and hardstanding ground.

The site is approximately centred on the OS grid reference: **TQ3298690150**.

Site location maps are presented in **Annex A**.

6.2. Site Description

Section A is occupied by a joint cycle and pedestrian access way and open, vegetated ground. Section B is occupied by structures formerly associated with Moselle School, open hardstanding ground and a section of open, vegetated ground. Section C is occupied by several multi-storey residential structures directly associated with the Broadwater Farm Estate and the Broadwater Farm Community Centre, a section of a roadway and areas of open vegetated and hardstanding ground. Section D is occupied by Broadwater Lodge (comprising two adjoining complexes of housing association structures) and areas of open vegetated and hardstanding ground.

A recent aerial photograph and site plan are presented in **Annex B** and **Annex D**.

7. Scope of the Proposed Works

7.1. General

The exact scope of the proposed works was not known at the time of writing this report. It is understood however that the works will include the refurbishment of existing homes on the Broadwater Farm Estate and the development of new homes, amongst other developments.

8. Ground Conditions

8.1. General Geology

The British Geological Survey (BGS) map shows the site to be underlain by London Clay Formation- Clay, Silt and Sand. This underlying bedrock was formed in the Palaeogene Period.

8.2. Site Specific Geology

Site-specific geotechnical data was not available during the production of this report.

9. Site History

9.1. Introduction

The purpose of this section is to identify the composition of the site pre and post-WWII. It is important to establish the historical use of the site, as this may indicate the site's relation to potential sources of UXO as well as help with determining factors such as the land use, groundcover, likely frequency of access and signs of bomb damage.

9.2. A Brief Summary of the History of the Site

The following sections provide a brief summary of the pre- and post WWII history of the site. This information have been adapted from project information provided by Select Surveys Ltd.

9.2.1. Pre-WWII

The area covering Broadwater Farm Estate and its surroundings was rural farmland up until 1872 when the Bruce Grove railway station opened and new development started to emerge. Before this point, the only buildings in the area were farmhouses and outbuildings of Broadwater Farm. After construction of the Tottenham and Wood Green railways, residential development took place rapidly in the surrounding area. Because its location within the valley of the Moselle River, and the flooding threats associated with the area, Broadwater Farm was not considered appropriate for development for a long period of time. In 1932, Tottenham urban district council purchased the farmland and converted it for recreational use, forming the current Lordship Recreation Ground. The eastern side, where the estate sits today, was temporarily used as allotments.

9.2.2. Post WWII

In 1967, construction began on the Broadwater Farm Estate, initially providing 1,078 homes for between 3,000-4,000 people. It covers an area of approximately 8.46 ha, and it has 12 large concrete buildings, 2 tall towers; Northolt and Kenley (both 19 storeys, and the large Tangmere block (7 storeys). The ground floor area is predominantly used for undercroft car parking, with Homes for Haringey offices at the bottom of Tangmere.

Shortly after completion, problems were identified including water leakages, pest infestation, and electrical faults. In 1976, less than ten years after the estate opened, the Department of the Environment concluded that the Estate was of such poor quality that the only solution was demolition, which was objected to by residents. A new neighbourhood housing office was instead set up and £1m spent on repairing and replacing windows, redecoration and improving security.

After 1985, Broadwater Farm Estate became the focus of an intensive £33 million regeneration programme in response to the problems highlighted by local riots. The surrounding areas were landscaped and each building redesigned to give it a unique identity and new access cores.

9.3. Ordnance Survey Historical Maps

Relevant historical maps were obtained for this report and are presented in **Annex E**. See below for a summary of the site history shown on acquired mapping.

Pre-WWII		
Date	Scale	Description
1935-36	1:2,500	Section A is shown to have been occupied by open ground, a small section of the River Moselle and potentially some allotment gardens. Section A is bordered to the east by residential housing. Section B is shown to have been fully occupied by allotment gardens. Section C is shown to have been occupied by allotment gardens with the River Moselle running through. Section D is occupied by allotment gardens next to an area of residential houses.

Post-WWII		
Date	Scale	Description
1955-56	1:2,500	No discernible changes can be seen to have occurred across all four sections of the site. Several structures have been built to the north of the site.

9.4. Pre-WWII Photography of the Site

Pre-WWII aerial photography has been obtained from the Aerofilms collection available from *Britain From Above*. This imagery provides a view of the site in 1935 (see **Annex F**). See below for a description:

Title of Photograph	Comments
The White Hart Lane Estate, Tower Gardens, 1935	Section A is shown to have been occupied by an access path and open ground. Section B is occupied by allotment gardens with what appears to be a hedgerow running alongside the western boundary. Section C is occupied by allotment gardens and a section of the River Moselle. Section D is occupied by allotment gardens next to residential housing.

10. Introduction to German Aerial Delivered Ordnance

10.1. General

During WWI and WWII, the UK was subjected to bombing which often resulted in extensive damage to city centres, docks, rail infrastructure and industrial areas. The poor accuracy of WWII targeting technology and the nature of bombing techniques often resulted in neighbouring areas to targets sustaining collateral damage.

In addition to raids which concentrated on specific targets, indiscriminate bombing of large areas also took place. This occurred most prominently in the London 'Blitz', though affected many other towns and cities. As discussed in the following sections, a proportion of the bombs dropped on the UK did not detonate as designed. Although extensive efforts were made to locate and deal with these UXBs at the time, many still remain buried and can present a potential risk to construction projects.

The main focus of research for this section of the report will concern German aerial delivered ordnance dropped during WWII, although WWI bombing will also be considered.

10.2. Generic Types of WWII German Aerial Delivered Ordnance

To provide an informed assessment of the hazards posed by any items of unexploded ordnance that may remain in situ on site, the table below provides information on the types of German aerial delivered ordnance most commonly used by the Luftwaffe during WWII. Images and brief summaries of the characteristics of these items of ordnance are listed in **Annex G**.

Generic Types of WWII German Aerial Delivered Ordnance		
Type	Frequency	Likelihood of detection
High Explosive (HE) bombs	In terms of weight of ordnance dropped, HE bombs were the most frequently deployed by the Luftwaffe during WWII.	Although efforts were made to identify the presence of unexploded ordnance following an air raid, often the damage and destruction caused by detonated bombs made observation of UXB entry holes impossible. The entry hole of an unexploded bomb can be as little as 20cm in diameter and was easily overlooked in certain ground conditions (see Annex H). Furthermore, ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded smaller bomb. UXBs therefore present the greatest risk to present-day intrusive works.
1kg Incendiary bombs (IB)	In terms of the number of weapons dropped, small IBs were the most numerous. Millions of these were dropped throughout WWII.	IBs had very limited penetration capability and in urban areas would often have been located in post-raid surveys. If they failed to initiate and fell in water, on soft vegetated ground, or bombed rubble, they could easily go unnoticed.
Large Incendiary bombs (IB)	These were not as common as the 1kg IBs, although they were more frequently deployed than PMs and AP bomblets.	If large IBs did penetrate the ground, complete combustion did not always occur and in such cases they could remain a risk to intrusive works.
Aerial or Parachute mines (PM)	These were deployed less frequently than HE and IBs due to size, cost and the difficulty of deployment.	If functioning correctly, PMs would generally have had a slow rate of descent and were very unlikely to have penetrated the ground. Where the parachute failed, mines would have simply shattered on impact if the main charge failed to explode. There have been extreme cases when these items have been found unexploded. However, in these scenarios, the ground was either extremely soft or the munition fell into water.
Anti-personnel (AP) bomblets	These were not commonly used and are generally considered to pose a low risk to most works in the UK.	SD2 bomblets were packed into containers holding between 6 and 108 submunitions. They 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.

10.3. Failure Rate of German Aerial Delivered Ordnance

It has been estimated that 10% of WWII German aerial delivered HE bombs failed to explode as designed. Reasons for why such weapons might have failed to function as designed include:

- Malfunction of the fuze or gain mechanism (manufacturing fault, sabotage by forced labour or faulty installation).
- Many were fitted with a clockwork mechanism that could become immobilised on impact.
- Failure of the bomber aircraft to arm the bombs due to human error or an equipment defect.
- Jettisoning the bomb before it was armed or from a very low altitude. This most likely occurred if the bomber aircraft was under attack or crashing.

From 1940 to 1945, bomb disposal teams reportedly dealt with a total of 50,000 explosive items of 50kg, over 7,000 anti-aircraft projectiles and 300,000 beach mines. Unexploded ordnance is still regularly encountered across the UK, see press articles in **Annex I**.

10.4. UXB Ground Penetration

An important consideration when assessing the risk from a UXB is the likely maximum depth of burial. There are several factors which determine the depth that an unexploded bomb will penetrate:

- Mass and shape of bomb.
- Height of release.
- Velocity and angle of bomb.
- Nature of the ground cover.
- Underlying geology.

Geology is perhaps the most important variable. If the ground is soft, there is a greater potential of deeper penetration. For example, peat and alluvium are easier to penetrate than gravel and sand, whereas layers of hard strata will significantly retard and may stop the trajectory of a UXB.

10.4.1. The J-Curve Effect

J-curve is the term used to describe the characteristic curve commonly followed by an aerial delivered bomb dropped from height after it penetrates the ground. Typically, as the bomb is slowed by its passage through underlying soils, its trajectory curves towards the surface. Many UXBs are found with their nose cone pointing upwards as a result of this effect. More importantly, however, is the resulting horizontal offset from the point of entry. This is typically a distance of about one third of the bomb's penetration depth, but can be higher in certain conditions (see **Annex H**).

10.4.2. WWII UXB Ground 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 (BD) teams. Conclusions were drawn predicting the likely average and maximum depths of penetration of different sized bombs in different geological strata.

For example, the largest common German bomb (500kg) had a likely concluded penetration depth of 6m in sand or gravel but 11m in clay. The maximum observed depth for a 500kg bomb was 11.4m and for a 1,000kg bomb 12.8m. Theoretical calculations suggested that significantly greater penetration depths were probable.

10.4.3. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the site of proposed works the following parameters have been used:

- WWII geology – London Clay Formation- Clay, Silt and Sand.
- Impact angle and velocity – 10-15° from vertical and 270 metres per second.
- Bomb mass and configuration – The 500kg SC HE bomb, without retarder units or armour piercing nose (this was the largest of the common bombs used against Britain).

It has not been possible to determine maximum bomb penetration capabilities at this stage due to the lack of site-specific geotechnical information currently available. An assessment can be made once further information becomes available or by an UXO Specialist on-site.

10.5. V-Weapons

Hitler's 'V-weapon' campaign began from mid-1944. It used newly developed unmanned cruise missiles and rockets. The V-1, known as the *flying bomb* or *pilotless aircraft*, and the V-2, a long range rocket, were launched from bases in Germany and occupied Europe. A total of 2,419 V-1s and 517 V-2s were recorded in the London Civil Defence region alone.

Although these weapons caused considerable damage, their relatively low numbers allowed accurate records of strikes to be maintained. These records have mostly survived. There is a negligible risk from unexploded V-weapons on land today. Even if the 1000kg warhead failed to explode, the weapons are so large that they would have been observed and dealt with at the time. Therefore, V-weapons are referenced in this report not as a viable risk factor, but primarily in order to help account for evidence of damage and clearance reported.

11. The Likelihood of Contamination from German Aerial Delivered UXBs

11.1. World War I

During WWI Britain was targeted and bombed by Zeppelin Airships, as well as Gotha and Giant fixed-wing aircraft. 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 map of air raids and naval bombardments across England is presented in **Annex J**. This source records WWI bombing to have occurred in the wider site area. However, no evidence could be found to suggest that any WWI bombing took place within the immediate area of the site- WWI mapping shows two air raids to have occurred in the Tottenham area on the 2nd/3rd of September 1916 and the 19th/20th May 1918 but neither maps shows bombing on site (see **Annex K** for copies of these maps).

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

11.2. World War II Bombing of Tottenham

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

During WWII, the site was located within the Municipal Borough of Tottenham, which sustained a high density of bombing, as represented by bomb density data figures and maps; see **Annex L**. A large number of industrial points of interest were located in the borough, which would have posed as likely Luftwaffe bombing targets. Furthermore, the area's proximity to the River Lee, which was likely used reference point of navigation by the Luftwaffe, may have resulted in further auxiliary bombing.

Luftwaffe target reconnaissance imagery indicates Tottenham Water Treatment Works as a target (located approximately 1.8km south-east of the site); see **Annex M**. Targets in the wider surrounding area included the Enfield Power Station and King George's Reservoir (located approximately 8km north of the site). Neighbouring areas would often be affected by the presence of such a target, partly due to proximity and the fact that Luftwaffe bomber aircraft would often deploy any remaining bombs on adjacent areas. Much of the bombing on the region can be attributed to these potential targets in the region and any bombing inflicted upon the civilian population.

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

Records of bombing incidents are presented in the following sections.

11.3. WWII Home Office Bombing Statistics

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

Record of German Ordnance Dropped on the Municipal Borough of Tottenham		
Area Acreage		3,013
Weapons	High Explosive bombs (all types)	283
	Parachute mines	4
	Oil bombs	18
	Phosphorus bombs	0
	Fire pots	0
	Pilotless aircraft (V-1)	5
	Long range rocket bombs (V-2)	3
Total		313
Number of Items per 1,000 acres		103.9

Source: Home Office Statistics

This table does not include UXO found during or after WWII.

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

11.4. London Civil Defence Region Bomb Census Maps

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

Consolidated London Bomb Census Maps – Annex N1	
Date Range	Comments
Night Bombing up to 7 th October 1940	Two bombs are recorded on Section C in the southern area. Another bomb is recorded on the boundary line of Section C. One bomb is recorded between Section C and Section D. Several bombs are recorded in the general area. However, no bombs are recorded directly on Section A, B or D.
7 th October 1940 to 6 th June 1941	No bombs are recorded on site. The closest recorded incident was approximately 210m to the south-east of Section C.

Weekly London Bomb Census Maps – Annex N2	
Date Range	Comments
7 th -14 th October 1940	No bombs are recorded directly on site. An incendiary bomb ‘shower’ is recorded in close proximity to Section A.
28 th October- 4 November 1940	An incendiary bomb ‘shower’ is recorded to have swept Section C and Section D.

V-1 Pilotless Aircraft Bomb Census Map – Annex O	
Date Range	Comments
1944-45	No V-1 bombs are recorded on site. The closest recorded incident was recorded approximately 185m to the east of Section A.

11.5. Tottenham Air Raid Precautions Bomb Map

A bomb map compiled by Tottenham Borough Council showing high explosive and incendiary bomb strikes on the borough was obtained from Haringey Archives. A section of the map showing the site area and any relevant bombing incidents is presented in **Annex P** and is discussed below. This map does not have a key as written records accompany each recorded incident- see **Section 11.6** for further information.

Tottenham Air Raid Precautions Bomb Map – Annex P	
Date	Comments
1940-1945	Two bombing incidences are recorded on site. One, labelled No. 143 is recorded in the southern area of Section C (this refers to three H.E bombs) and the other (one UXB), labelled No. 257 is situated adjacent to the southern area of Section B and the northern area of Section C. These incidences correlate with written records- see Section 11.6 below.

11.6. Air Raid Incident Records

Written records were obtained from Haringey Archives. These records correlate with the Tottenham Air Raid Precautions Bomb Mapping described in **Section 11.5**. A transcript of the relevant written records is presented in the table below. Example imagery of these entries are presented in **Annex Q**.

Air Raid Incident Records – Annex Q	
Date Range	Comments
18/09/1940	Incident No. 143: 3 H.E bombs were recorded at Lordship Recreation Ground.
06/10/1940	Incident No. 257: One unexploded H.E bomb was recorded to have hit ‘Allotments, Lordship Lane Recreation ground, rear Gloucester Road’. This UXB is recorded to have later exploded on the 15 th October 1940.

11.7. Middlesex County Council War Damage Map

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

It should be highlighted that this source only records the following damage categories: 'Total damage, building to be demolished', 'damaged beyond repair' and 'seriously damaged; doubtful if repairable'. The lesser damage categories, such as seriously damaged but repairable at cost and general blast damage, were not used.

MCC War Damage Map – Annex R	
Date Range	Comments
1940-1945	No damage is recorded on site. However, this is likely due to the lack of structures on site which damage could be attributed to. The damage mapping would not have covered open ground. No damage is documented to any of the structures within the roads immediately surrounding the site.

11.8. Haringey Damage Map

A map recording wartime damage within the Municipal Borough of Tottenham was accessed at Haringey Archives. This map, as above, only recorded damage to structures and so does not cover the site as there were no structures.

11.9. WWII-Era Aerial Photography

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

WWII-Era Aerial Photography – Annex S	
Date	Description
Circa 1945	The photography shows the site to have been occupied by allotment gardens, open ground and a section of the River Moselle. No obvious signs of damage such as cratering or ground disturbances can be seen. However, this photography is low resolution and the ground cover poor, so this does not mean that no damage occurred on site.
1945-49	This photography appears to be consistent with the previous image.
24/07/1947	This photograph covers Section D and a part of Section C. The photograph shows these areas to have been occupied by allotment gardens and an access path appears to run through Section D. No obvious signs of bombing such as cratering and ground disturbances can be seen. However, given that these sections of the site were occupied by allotment gardens, it is thought unlikely that any indications of bombing would have been spotted – they may have been obscured by such ground conditions.

11.10. Abandoned Bombs

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

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

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

11.11. Bomb Disposal Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD) (now 29 Regt) is currently facing considerable delay. It has therefore not been possible to include any updated official information regarding bomb disposal/clearance tasks with regards to this site. A database of known disposal/clearance tasks has been referred to which does not make reference to such instances occurring within the site of proposed works. If any relevant information is received at a later date Select Surveys Ltd. will be advised.

11.12. Evaluation of German Aerial Delivered UXO Records

Factors	Conclusion
Density of Bombing <i>It is important to consider the bombing density when assessing the possibility that UXBs remain in an area. High bombing density could allow for error in record keeping due to extreme damage caused to the area.</i>	During WWII the site was located in the Municipal Borough of Tottenham which was subject to an overall high density of bombing, with an average of 103.9 bombs recorded per 1,000 acres according to official Home Office statistics. The presence of targets including Tottenham Water Treatment Works (approximately 1.8km to the south-east of the site) and the King George Reservoir in the surrounding area resulted in notable raids on the borough. London Bomb Census mapping records two bombs in the southern area of Section C, with an additional bomb on the boundary of Section C. The mapping also records one bomb between Section C and Section D and an incendiary bomb 'shower' which swept Section C and Section D. No bombs are recorded directly on Section A, B or D. Tottenham Air Raid Precautions Bomb Mapping records incident No. 143 on Section C. This refers to three H.E bombs which approximately correlates with London Bomb Census Mapping. The mapping also records incident No. 257 which affected both Section B and Section C. This incident was recorded to have been an unexploded H.E bomb, which exploded several days later.
Damage <i>If buildings or structures on a site sustained bomb or fire damage, any resulting rubble and debris could have obscured the entry holes of unexploded bombs dropped during the same or later raids. Similarly, a high explosive bomb strike in an area of open agricultural land will have caused soil disturbance, increasing the risk that a UXB entry hole would be overlooked.</i>	All sections of the site were occupied by either open ground, allotment gardens or a section of the River Moselle. Damage mapping tended to only record damage to structures. Middlesex County Council Damage Mapping and Haringey Damage Mapping were both consulted but there were no structures on site which damage could be attributed to. Post-WWII aerial photography does not appear to show obvious signs of bombing such as cratering or disturbances. However, the ground cover provided poor conditions for showing evidence of UXO (see the below section for further information). Additionally the only high resolution photography that was available does not cover the majority of the site and the other photography available is of a low resolution. Therefore, it has proven difficult to be able to identify any obvious indications of bombing across all four site sections.
Ground Cover <i>The nature of the ground cover present during WWII would have a substantial influence on any visual indication that may indicate UXO being present.</i>	As previously mentioned, the site was occupied by open ground, allotment gardens and a section of the River Moselle. None of these types of ground cover are considered conducive to the easy observation of evidence of UXO. Rural ground and allotment gardens are liable to grow and shift which can obscure potential entry holes. Bodies of water can also obscure potential entry holes. Therefore, within these conditions it is possible that potential entry holes could have been over looked- especially as the entry hole for a 50kg H.E bomb could be as small as 20cm in diameter.



Access Frequency <i>UXO in locations where access was irregular would have a greater chance of passing unnoticed than at those that were regularly occupied. The importance of a site to the war effort is also an important consideration as such sites are likely to have been both frequently visited and subject to post-raid checks for evidence of UXO.</i>	The majority of the site was occupied by allotment gardens. The frequency of access to allotment gardens would have been wholly dependent upon each garden user and so access frequency to each allotment garden cannot be determined with confidence. Other areas of the site were occupied by areas of open ground. Given that these areas did not appear to contain any structures/features of significance, it is unlikely that these areas would have been frequently accessed during the war. This decreases the likelihood that items of UXO would have been spotted, reported and dealt with. However, it is anticipated that sections of the site that were situated immediately adjoining sections of surrounding roadway and housing, such as Section A and the southern section of Section D, would have been subject to a higher degree of monitor. Any evidence of UXO on site is therefore most likely to have been spotted in these areas.
Bomb Failure Rate	There is no evidence to suggest that the bomb failure rate in the locality of the site would have been dissimilar to the 10% normally used.
Abandoned Bombs	1 st Line Defence holds no records of abandoned bombs at or within the site vicinity.
Bombing Decoy sites	1 st Line Defence could find no evidence of bombing decoy sites within the site vicinity.
Bomb Disposal Tasks	1 st Line Defence could find no evidence of bomb disposal tasks within the site boundary and immediate area.

12. Introduction to Allied Explosive Ordnance

12.1. General

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

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

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

12.2. Defending the UK From Aerial Attack

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

Active Defences	Passive Defences
• Anti-aircraft gun emplacements to engage enemy aircraft. • Fighter aircraft to act as interceptors. • Rockets and missiles were used later during WWII.	• Blackouts and camouflaging to hinder the identification of Luftwaffe targets. • Decoy sites were located away from targets and used dummy buildings and lighting to replicate urban, military, or industrial areas. • Barrage balloons forced enemy aircraft to greater altitudes. • Searchlights were often used to track and divert adversary bomber crews during night raids.

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

12.2.1. Anti-Aircraft Artillery (AAA)

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

Anti-Aircraft Artillery				
Item	Description			
HAA	These large calibre guns such as the 3.7" QF (Quick Firing) were used to engage high flying enemy bombers. They often fired large HE projectiles, which were usually initiated by integral fuzes, triggered by impact, area, time delay or a combination of aforementioned mechanisms.			
LAA	These mobile guns were intended to engage fast, low flying aircraft. They were typically rotated between locations on the perimeters of towns and strategically important industrial works. As they could be moved to new positions with relative ease when required, records of their locations are limited. The most numerous of these were the 40mm Bofors gun which could fire up to 120 x 40mm HE projectiles per minute to over 1,800m.			
Variations in HAA and LSA Ammunition	Gun type	Calibre	Shell Weight	Shell Dimensions
	3.0 Inch	76mm	7.3kg	76mm x 356mm
	3.7 Inch	94mm	12.7kg	94mm x 438mm
	4.5 Inch	114mm	24.7kg	114mm x 578mm
	40mm	40mm	0.9kg	40mm x 311mm
Z-AA	The three inch unrotated rocket/projectile known as the UP-3 had initially been developed for the Royal Navy. The UP-3 was also used in ground-based single and 128-round launchers known as "Z" batteries. The rocket, containing a high explosive warhead was often propelled by cordite.			

The closest recorded HAAs to the site were located approximately 3.3km north and 3.3km south of the site, however the range of a projectile can be up to 15km. The site would also have been in range of mobile light anti-aircraft guns.

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

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at **Annex T**.

13. The Likelihood of Contamination from Allied Ordnance

13.1. Introduction

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

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

13.2. Evaluation of Contamination Risk from Allied UXO

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

Sources of Allied UXO Contamination	Conclusion
Military Camps <i>Military camps present an elevated risk from ordnance simply due to the large military presence and likelihood of associated live ordnance training.</i>	1 st Line Defence could find no evidence of a military camp within the site.
Anti-Aircraft Defences <i>Anti-Aircraft defences were employed across the country. Proximity to anti-aircraft defences increases the chance of encountering AA projectiles.</i>	1 st Line Defence could find no evidence of Anti-Aircraft defences such as a HAA or LAA gun emplacement occupying or bordering the site. The closest HAAs were located approximately 3.3km north and 3.3km south of the site, however the range of a projectile can be up to 15km. The conditions in which HAA or LAA projectiles may have fallen unnoticed within a site footprint are analogous to those regarding German aerial delivered ordnance.
Home Guard Activity <i>The Home Guard regularly undertook training and ordnance practice in open areas, as well as burying ordnance as part of anti-invasion defences.</i>	1 st Line Defence has no evidence of any Home Guard activities on the site.
Defensive Positions <i>Defensive positions suggest the presence of military activity, which is often indicative of ordnance storage, usage or disposal.</i>	There is no evidence of any defensive features formerly located on or bordering the site footprint.
Training or firing ranges <i>Areas of ordnance training saw historical ordnance usage in large numbers, often with inadequate disposal of expended and live items. The presence of these ranges significantly impact on the risk of encountering items of ordnance in their vicinity.</i>	There is no evidence of such features affecting the site.



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

14. The Likelihood of UXO Contamination Summary

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

UXO Contamination Summary	
Quality of the Historical Record	The research has evaluated pre- and post-WWII Ordnance Survey maps, Luftwaffe reconnaissance imagery, Bomb Census mapping, Tottenham Bomb mapping, Air Raid Incident Records, Middlesex Damage mapping, Haringey Damage mapping and post-WWII aerial and oblique photography. The record set is of generally good quality including the bomb maps and corresponding written records. However, the aerial photography is either incomplete or low-resolution, making it difficult to determine the exact conditions on site during the war and to identify obvious indications of bombing.
German Aerial Delivered Ordnance	- During WWII the site was located in the Municipal Borough of Tottenham which was subjected to an overall high density of bombing, with an average of 103.9 bombs recorded per 1,000 acres according to official Home Office statistics. - London Bomb Census mapping records two bombs directly on Section C and two additional bombs adjacent. The type of bomb was not specified in this mapping. Incendiary bombing is also recorded over Section C and D in weekly London Bomb Census mapping. Local bomb mapping for Tottenham records three H.E bombs to have fallen within Section C, which is roughly consistent with the London Bomb Census mapping. The map also records one unexploded H.E bomb on the boundaries of Section B and Section C. The local written records corroborate these incidences. - Middlesex and Haringey Bomb damage maps were consulted. Whilst neither of these recorded damage on site, there were no structures present on site during wartime for damage to be attributed to. Post-WWII aerial photography does not appear to show obvious signs of damage. However, this photography is either incomplete or of a low resolution. In addition, given that the majority of all sections of the site were occupied either by allotment gardens or areas of open vegetated land, it is possible that signs of a UXB may have been concealed by such ground conditions.



	- The ground cover across the majority of the site would therefore not have been conducive to the easy observation of evidence of UXO. Open ground and allotment gardens are liable to grow and shift that can obscure potential entry holes, especially as the entry hole for a 50kg H.E bomb could be as small as 20cm in diameter. - As the site was occupied by open ground, allotment gardens and a section of a river it seems likely that access would generally have been either infrequent (to the areas of open ground and the river) or sporadic (to the areas of allotment gardens). The access would also likely have been lowered following the incidences of bombing that occurred in Section C and close proximity to Section B. - However, it is anticipated that sections of the site that were situated immediately adjoining sections of surrounding roadway and housing, such as Section A and the southern section of Section D, would have been subject to a higher degree of monitor. Any evidence of UXO on site is therefore most likely to have been spotted in these areas. - Overall, given the above factors, Section A and the southern area of Section D, which were situated at a distance from recorded bomb strikes and closer to adjoining wartime roadways/housing have been assessed as Low-Medium Risk. (These areas were still occupied by allotment gardens and in the general vicinity of bombing, so could not be assessed 'Low Risk'). Section B, Section C and the northern area of Section D, which were situated on or nearer to bomb strikes and generally further away from roadways/housing, have been assessed as Medium Risk. See Annex U for a risk map of the site.
Allied Ordnance	There is no evidence that the site formerly had any military occupation or usage that could have led to contamination with items of Allied ordnance, such as LSA and SAA. The conditions in which HAA or LAA projectiles may have fallen unnoticed within the site boundary are however analogous to those regarding aerial delivered ordnance.

15. The Likelihood that UXO Remains

15.1. Introduction

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

15.2. UXO Clearance

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

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

15.3. Post-War Redevelopment

Significant development has occurred across the site since WWII. The main development has been the construction of the Broadwater Farm Estate which occupies the majority of Section C. Sections B and D have also seen the construction of several structures whilst Section A has seen the least development, which is limited to the construction of a cycle and access pathway.

The risk of UXO remaining is considered to be mitigated at the location of and down to the depth of any post-war redevelopment on site.

Within the footprints of post-WWII redevelopments, the risk from shallow-buried UXO (especially 1kg German incendiaries and British AA projectiles) should have been encountered/removed during initial excavations. However, the risk from deep-buried German UXBs will only have been mitigated within the volumes of any post-war pile foundations or deep excavations for basement levels. The risk will remain within virgin geology below and amongst these post-war works, down to the maximum bomb penetration depth.

16. The Likelihood of UXO Encounter

16.1. Introduction

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

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

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

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

16.2. Encountering Aerial Delivered Ordnance

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

17. The Likelihood of UXO Initiation

17.1. Introduction

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

17.2. Initiating Aerial Delivered Ordnance

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

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

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

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

18. Consequences of Initiation/Encounter

18.1. Introduction

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

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

18.2. Consequences of Detonation

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

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

19. 1st Line Defence Risk Assessment

19.1. Risk Assessment Stages

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

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

19.2. Assessed Risk Level

Section A and Southern Area of Section D:

1st Line Defence has assessed that there is an overall **Low-Medium Risk** from German and anti-aircraft unexploded ordnance within these areas, which were situated further from recorded bomb strikes and closer to wartime housing/roadways. There is an assessed **Low Risk** from all other types of Allied ordnance.

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

Section B, Section C and Northern Area of Section D:

1st Line Defence has assessed that there is an overall **Medium Risk** from German and anti-aircraft unexploded ordnance within these areas, which were situated on or near to recorded bomb strikes. . There is also an assessed **Low Risk** from all other types of Allied ordnance.

Ordnance Type	Risk Level			
	Negligible	Low	Medium	High
German Unexploded HE Bombs			✓	
German 1kg Incendiary Bombs			✓	
Allied Anti-Aircraft Artillery Projectiles			✓	



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

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

20. Proposed Risk Mitigation Methodology

20.1. General

The following risk mitigation measures are recommended to support the proposed works at Willan Road, Tottenham:

Type of Work	Recommended Mitigation Measure
All Works on All Sections	UXO Risk Management Plan It is recommended that a site-specific plan for the management of UXO risk be written for this site. This plan should be kept on site and be referred to in the event that a suspect item of UXO is encountered at any stage of the project. It should detail the steps to be taken in the event of such a discovery, considering elements such as communication, raising the alarm, nominated responsible persons etc. Contact 1st Line Defence for help/more information. Site Specific UXO Awareness Briefings to all personnel conducting intrusive works. As a minimum precaution, all personnel working on the site should be briefed on the basic identification of UXO and what to do in the event of encountering a suspect item. This should in the first instance be undertaken by a UXO Specialist. Posters and information on the risk of UXO can be held in the site office for reference.
Shallow Intrusive Works/Open Excavations on Sections B, C and Northern Area of Section D only (Medium Risk Areas)	Unexploded Ordnance (UXO) Specialist Presence on Site to support shallow intrusive works When on site the role of the UXO Specialist would include: - Monitoring works using visual recognition and instrumentation, including immediate response to reports of suspicious objects or suspected items of ordnance that have been recovered by the ground workers on site. - Providing UXO awareness briefings to any uninformed staff and advise staff of the need to modify working practices to take account of the ordnance risk. - To aid incident management which would involve liaison with the local authorities and police should ordnance be identified and present an explosive hazard.
Borehole/Piles on Sections B, C and Northern Area of Section D only (Medium Risk Areas)	Intrusive Magnetometer Survey of all borehole and pile locations down to a maximum bomb penetration depth: 1st Line Defence can deploy a range of intrusive magnetometer techniques to clear pile locations. The appropriate technique is influenced 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.

In making this assessment and recommending these risk mitigation measures, if known, the works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, 1st Line Defence should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

1st Line Defence Limited

23/11/2020

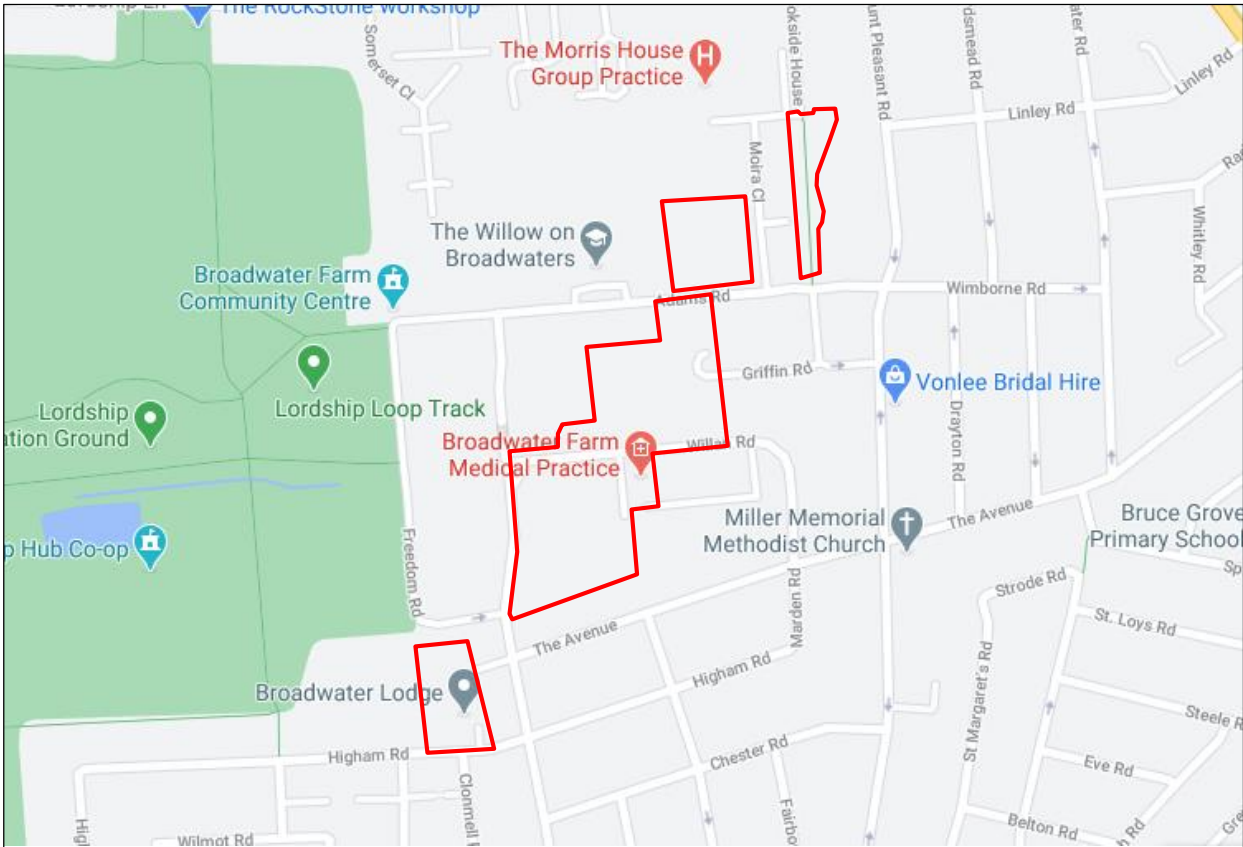
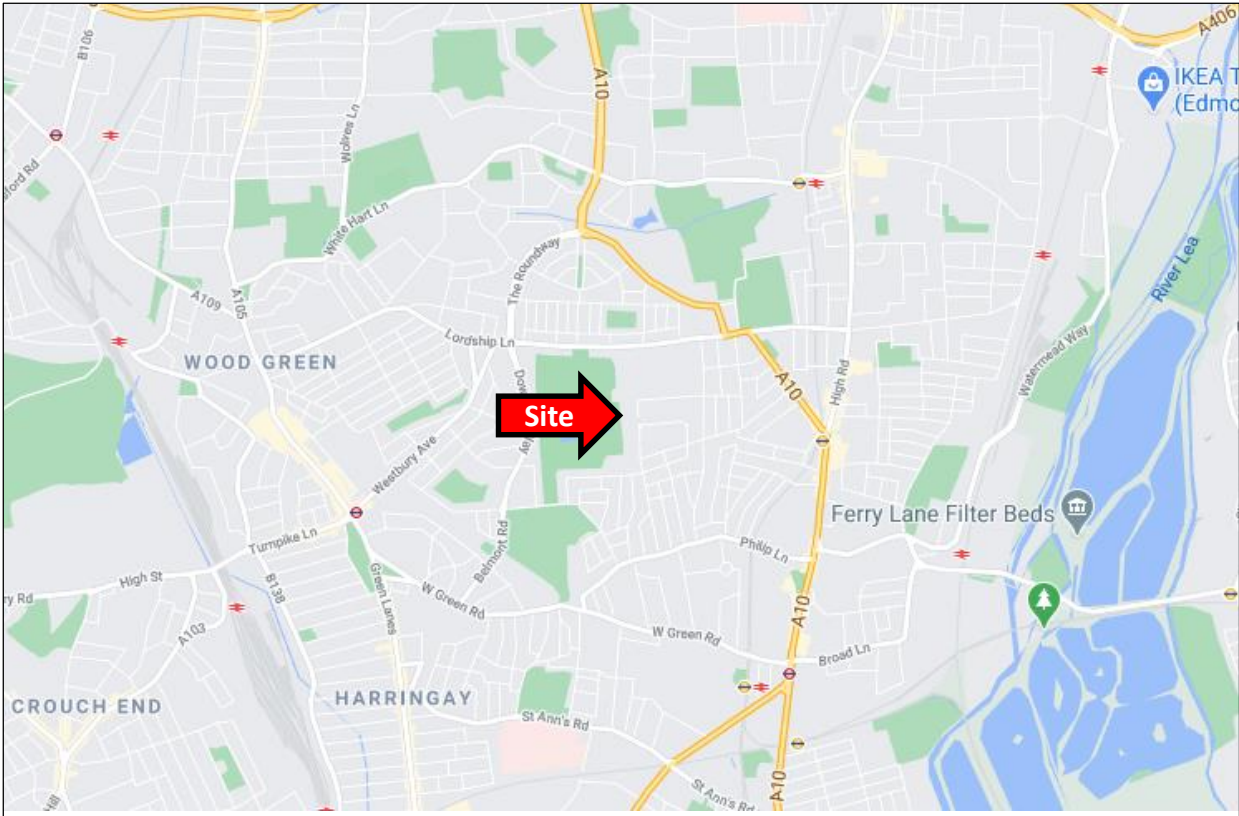
This Report has been produced in compliance with the Construction Industry Research and Information Association (CIRIA) C681 guidelines for the writing of Detailed UXO Risk Assessments.

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Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: Google Maps

 **Approximate site boundary**





1ST LINE DEFENCE

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Essex Road, Hoddesdon,
Hertfordshire. EN11 0EX
Email: info@1stlinedefence.co.uk
Tel: +44 (0)1992 245 020

Client: **Select Surveys Ltd.**

Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: Google Earth™ Mapping Services

 **Approximate site boundary**





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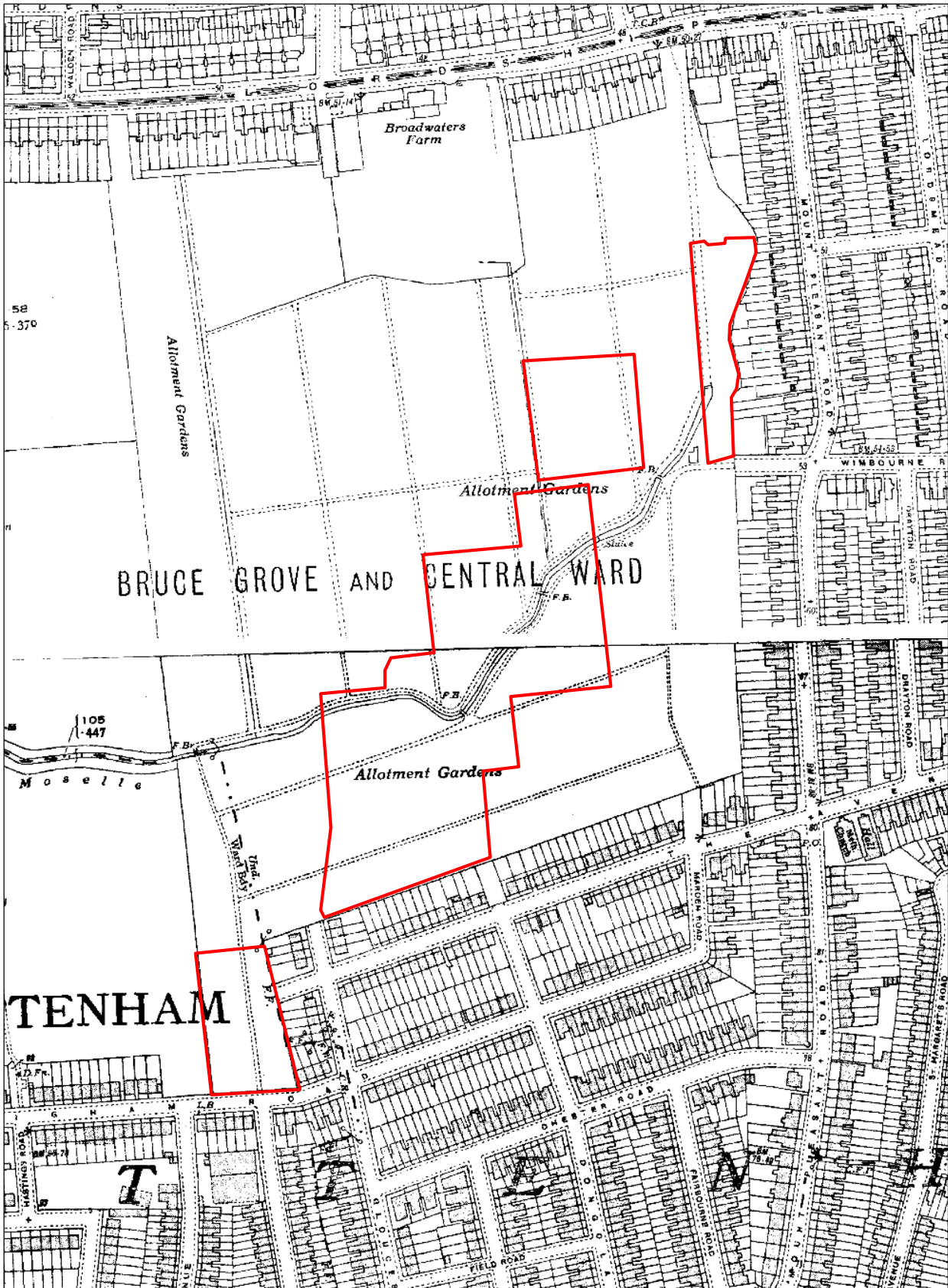
Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: **Select Surveys Ltd.**

 **Approximate site boundary**





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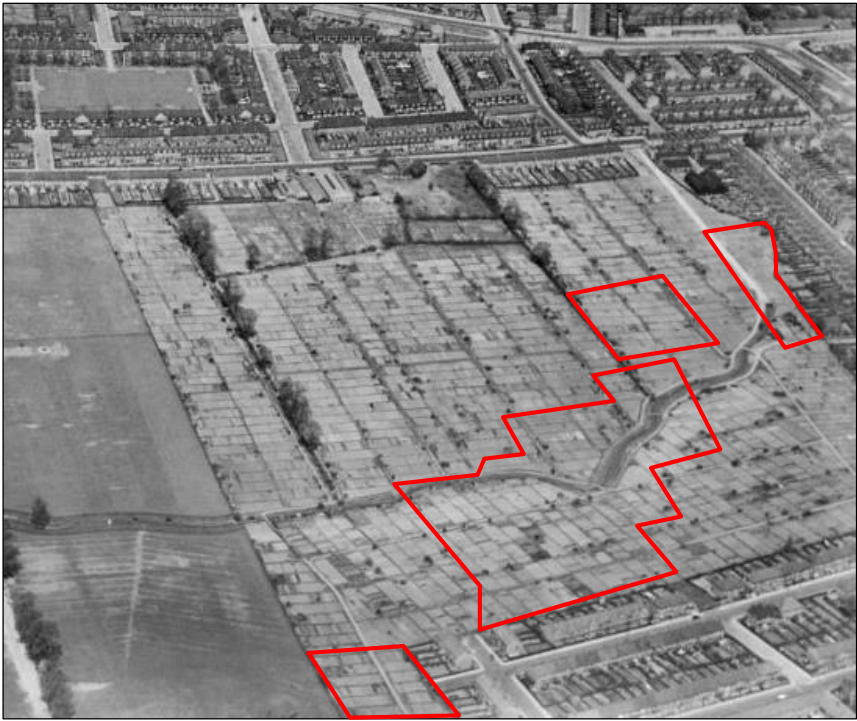
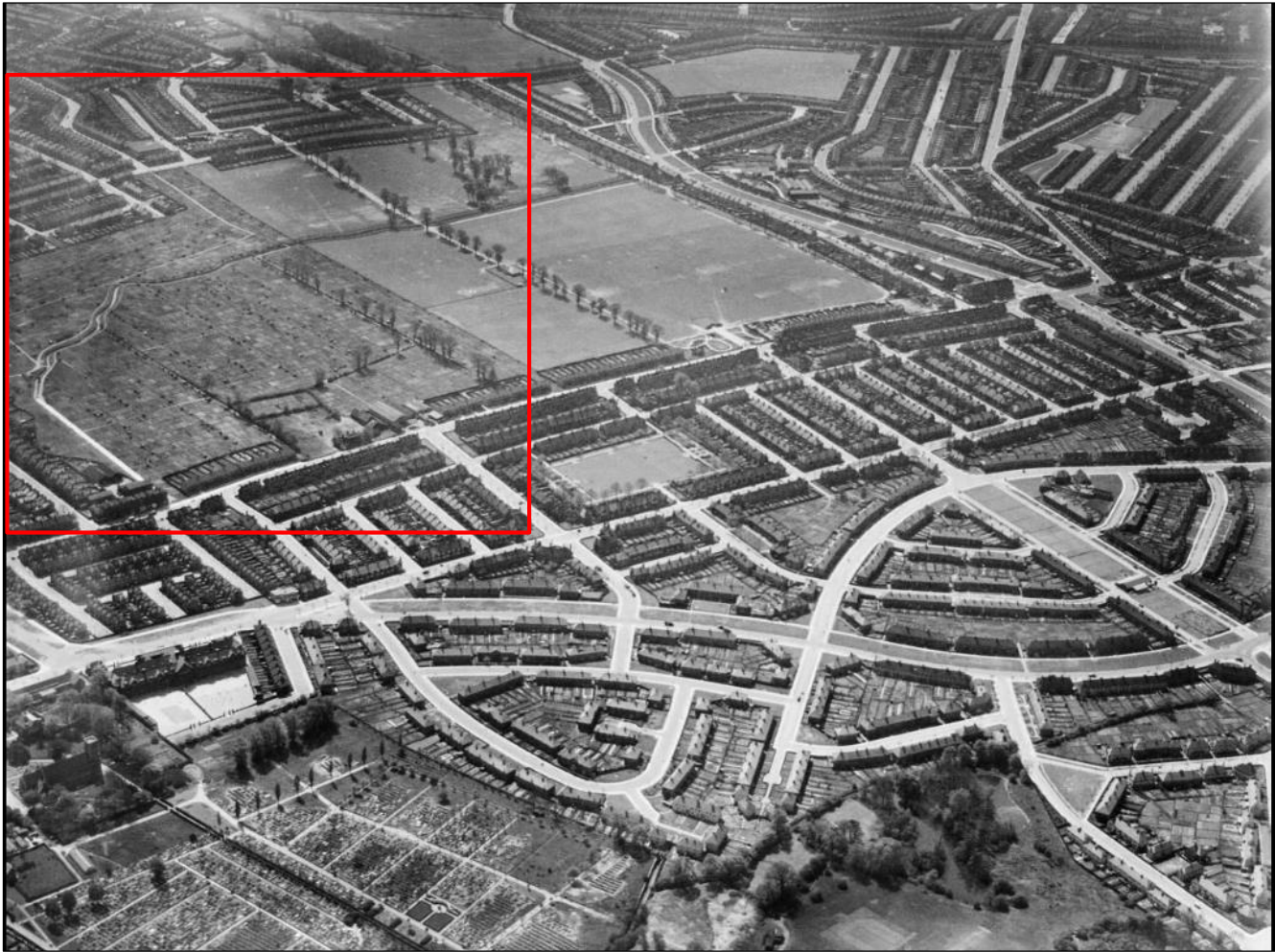
Source: Landmark Maps

 **Approximate site boundary**





The White Hart Lane Estate, Tower Gardens, 1935:



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Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: Britain from Above

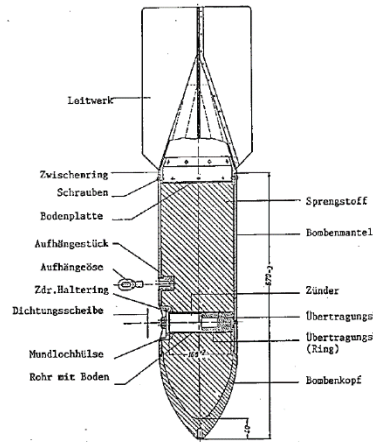
— Approximate site location

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Examples of German Air-Delivered Ordnance

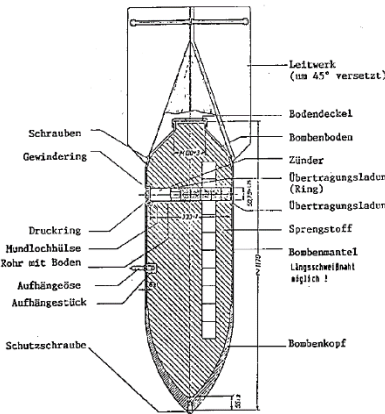
SC 50kg High Explosive Bomb

Bomb Weight	40-54kg (88-119lb)
Explosive Weight	25kg (55lb)
Fuze Type	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions	1,090 x 280mm (42.9 x 11.0in)
Body Diameter	200mm (7.87in)
Use	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.



SC 250kg High Explosive Bomb

Bomb Weight	245-256kg (540-564lb)
Explosive Weight	125-130kg (276-287lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1640 x 512mm (64.57 x 20.16in)
Body Diameter	368mm (14.5in)
Use	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.
Remarks	It could be carried by almost all German bomber aircraft, and was used to notable effect by the Junkers Ju-87 Stuka (Sturzkampfflugzeug or dive-bomber).

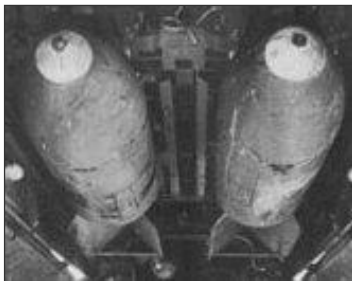
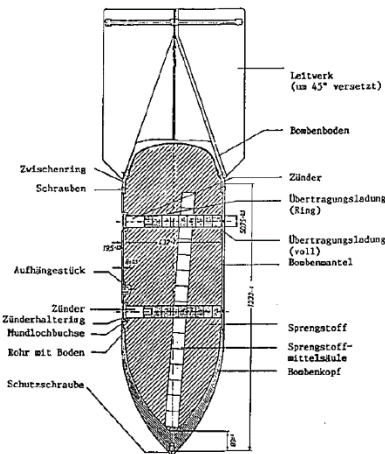


SC250 bomb being loaded onto German bomber



SC 500kg High Explosive Bomb

Bomb Weight	480-520kg (1,058-1,146lb)
Explosive Weight	250-260kg (551-573lb)
Fuze Type	Electrical impact/mechanical time delay fuze.
Bomb Dimensions	1957 x 640mm (77 x 25.2in)
Body Diameter	470mm (18.5in)
Use	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.
Remarks	40/60 or 50/50 Amatol TNT, trialene. Bombs recovered with Trialen filling have cylindrical paper wrapped pellets 1-15/16 in. in length and diameter forming



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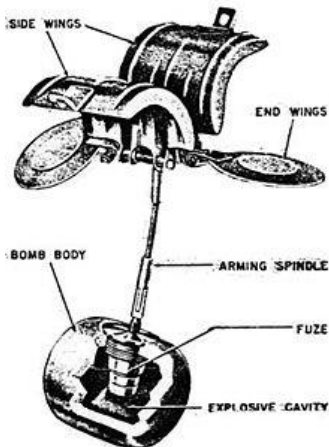
Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: Various sources

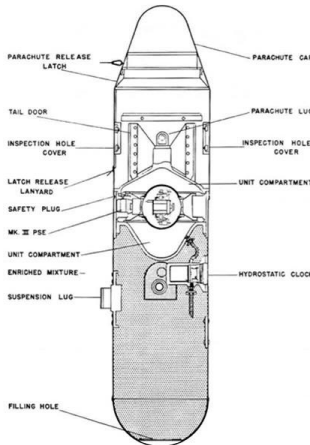
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SD2 Anti-Personnel ‘Butterfly Bomb’		
Bomb Weight	Approx. 2kg (4.41lb)	
Explosive Weight	Approx. 7.5oz (225 grams) of Amatol surrounded by a layer of bituminous composition.	
Fuze Type	41 fuze (time) , 67 fuze (clockwork time delay) or 70 fuze (anti-handling device)	
Body Diameter	3in (7.62 cm) diameter, 3.1in (7.874) long	
Use	Designed as an anti-personnel/ fragmentation weapon. They were delivered by air, being dropped in containers of 23-144 sub-munitions that opened at a predetermined height, thus scattering the bombs.	
Remarks	Very rare. First used against Ipswich in 1940, but were also dropped on Kingston upon Hull, Grimsby and Cleethorpes in June 1943, amongst various other targets in UK. As the bombs fell the outer case flicked open by springs which caused four light metal drogues with a protruding 5 inch steel cable to deploy in the form of a parachute & wind vane which armed the device as it span.	





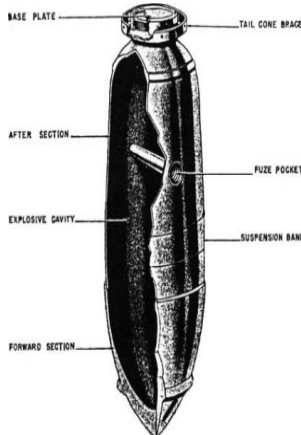


Parachute Mine (Luftmine B / LMB)		
Bomb Weight	Approx. 990kg (2176lb)	
Explosive Weight	Approx. 705kg (1,554lb)	
Fuze Type	Impact/ Time delay / hydrostatic pressure fuze	
Dimensions	2.64m x 0.64m (3.04m with parachute housing)	
Use	Against civilian, military and industrial targets. Used as blast bombs and designed to detonate above ground level to maximise damage to a wider area.	
Remarks	Deployed a parachute when dropped in order to control its descent. Had the potential to cause extensive damage in a 100m radius.	



SC 1000kg		
Bomb Weight	Approx. 993-1027kg (2,189-2,264lb)	
Explosive Weight	Approx. 530-620kg (1168-1367lb)	
Fuze Type	Electrical impact/mechanical time delay fuze.	
Filling	Mixture of 40% amatol and 60% TNT, but when used as an anti-shipping bomb it was filled with Trialen 105, a mixture of 15% RDX, 70% TNT and 15% aluminium powder.	
Bomb Dimensions	2800 x 654mm (110 x 25.8in)	
Body Diameter	654mm (18.5in)	
Use	SC type bombs are General Purpose Bombs used primarily for general demolition work. Constructed of parallel walls with comparatively heavy noses. They are usually of three piece welded construction	



BASE PLATE

TAIL CONE BRACE

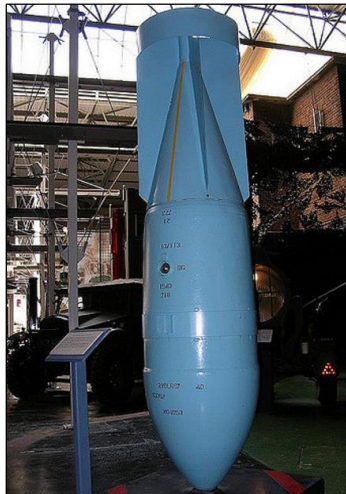
AFTER SECTION

FUZE POCKET

EXPLOSIVE CAVITY

SUSPENSION BAND

FORWARD SECTION



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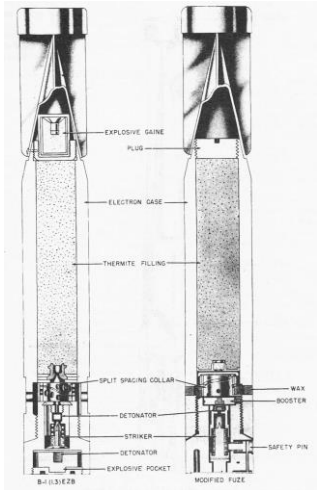


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Client:	Select Surveys Ltd.	
Project:	Willan Road, Tottenham	
Ref:	DA11350-00	Source: Various sources
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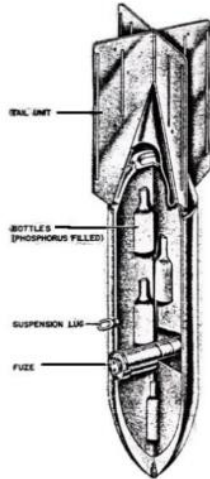
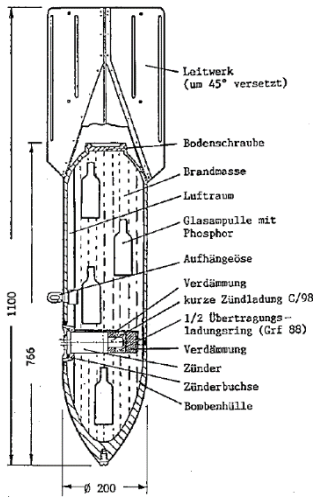
1kg Incendiary Bomb

Bomb Weight	Approx. 1.0 - 1.3kg (2.2 and 2.9lb)
Explosive Weight	Approx. 680g (1.5lb) Thermite 8-15gm Explosive Nitropenta
Fuze Type	Impact fuze
Bomb Dimensions	350 x 50mm (13.8 x 1.97in)
Body Diameter	50mm (1.97in)
Use	As incendiary – dropped in clusters on towns and industrial complexes
Remarks	Magnesium alloy case. Sometimes fitted with high explosive charge. The body is a cylindrical alloy casting threaded internally at the nose to receive the fuze holder and fuze.



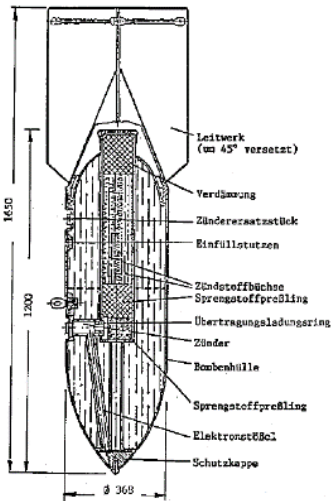
C50 A Incendiary Bomb

Bomb Weight	Approx. 41kg (90.4lb)
Explosive Weight	Approx. 0.03kg (0.066lb)
Incendiary Filling	12kg (25.5lb) liquid filling with phosphor igniters in glass phials. Benzine 85%; Phosphorus 4%; Pure Rubber 10%
Fuze Type	Electrical impact fuze
Bomb Dimensions	1,100 x 280mm (43.2 x 8in)
Use	Against any targets where an incendiary effect is required
Remarks	Early fill was a phosphorous/carbon disulphide incendiary mixture



Flam C-250 Oil Bomb

Bomb Weight	Approx. 125kg (276lb)
Explosive Weight	Approx. 1kg (2.2lb)
Fuze Type	Super-fast electrical impact fuze
Filling	Mixture of 30% petrol and 70% crude oil
Bomb Dimensions	1,650 x 512.2mm (65 x 20.2in)
Body Diameter	368mm (14.5in)
Use	Often used for surprise attacks on ground troops, against troop barracks and industrial installations. Thin casing – not designed for ground penetration



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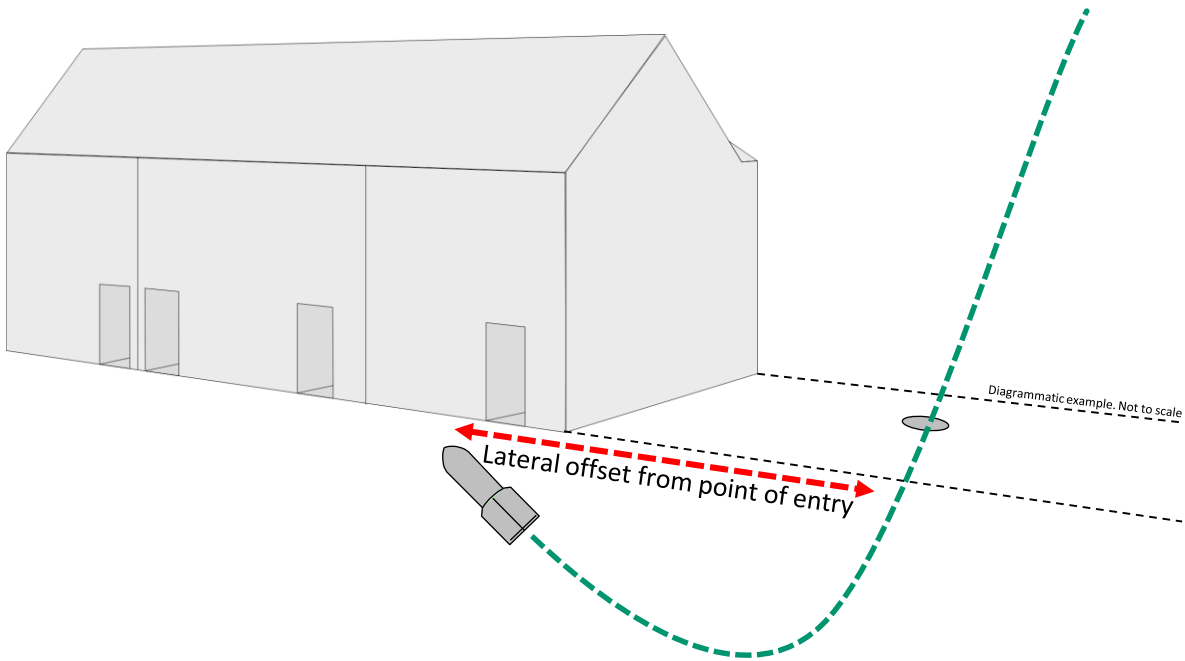
Client: Select Surveys Ltd.

Project: Willan Road, Tottenham

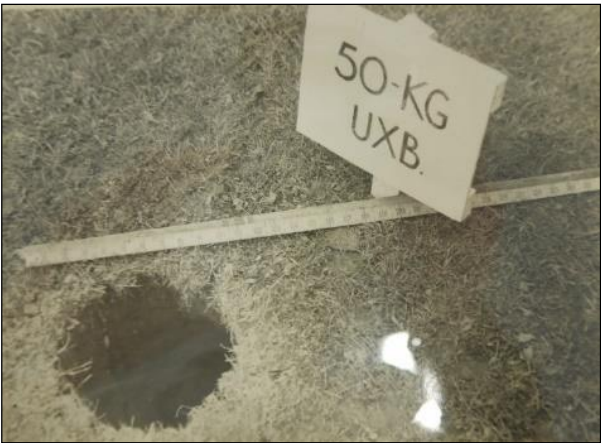
Ref: DA11350-00

Source: Various sources

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Top: J-curve Effect - Due to angle of entry, unexploded bombs would often end their trajectory at a lateral offset from point of entry, often ending up beneath adjacent extant structures/sites. The photograph above shows 250kg bomb found in Bermondsey pointing upwards, demonstrating 'J-curve'



One of the most common scenarios for UXO going unnoticed was when a UXB fell into a 'bomb site' (such as the area shown **Top Left**), the entry hole of the bomb obscured by any debris and rubble present. Note that the entry hole of a 50kg UXB could be as little as 20cm in diameter (**Left**).



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Bermondsey bomb: World War Two device safely removed



An unexploded World War Two bomb found in south London has been driven away safely under police and Army escort.

The 500lb (250kg) device was found on a building site in Grange Walk, Bermondsey on Monday.

March 2015



Bethnal Green WW2 bomb: Experts remove unexploded device



An unexploded World War Two bomb that prompted the evacuation of 700 people in east London has been made safe and removed by the military.

Families spent the night in a school hall after the 500lb bomb was found in the basement of a building site on Temple Street, in Bethnal Green, on Monday afternoon.

A 200m (650ft) exclusion zone was set up around the device.

August 2016



Bath WW2 bomb scare: Device defused, police say



A 500lb World War Two bomb found on the site of a former school in Bath has been defused and made safe.

The discovery of the bomb on Thursday led to the evacuation of hundreds of homes and many road closures in the Lansdown area of the city.

A cordon around the site was lifted on Friday evening, more than 24 hours after residents were asked to leave their homes.

May 2016



London City Airport reopens after WW2 bomb moved



London City Airport has reopened after an unexploded 500kg World War Two bomb was safely moved from the area.

The device was discovered at the King George V Dock on Sunday during planned work at the east London airport.

All flights were cancelled on Monday after an exclusion zone was put in place, with the closure affecting up to 16,000 passengers and nearby residents being evacuated from their homes.

May 2015



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Ref: DA11350-00

Source: BBC News

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BASF has confirmed that an explosive device, most likely a World War II-era bomb, caused the blast that left one person injured Tuesday at a plant construction site in Germany.

The explosion was reported at BASF's Ludwigshafen toluene diisocyanate (TDI) plant, which recently broke ground for a 300,000 metric tons per year TDI production plant and other construction to expand its facilities.



BASF Provides Some Details

Responding to a request from *PaintSquare News* for more information on Wednesday (Feb. 27), BASF's manager of media relations and corporate communications Europe, Ursula von Stetten, wrote in an email, "So here [are] the facts: The detonation took place at 10:00 a.m. One person was injured; the injury is not serious. He will be kept in the hospital for some days.

"Cause of the detonation was an explosive device, presumably a bomb deriving from the Second World War. The device detonated when grounding work was done. No details on [a] delay [are] available. At the moment, the exact circumstances of the incident are [being] evaluated."

1st March 2013

SPIEGEL ONLINE

Blast Kills One
World War II Bomb Explodes on German Motorway

A highway construction worker in Germany accidentally struck an unexploded World War II bomb, causing an explosion which killed him and wrecked several passing cars.



A World War II bomb has exploded during construction work on a German highway, killing one worker and injuring several motorists who were driving past, police said.

The worker had been cutting through the road surface near the south-western town of Aschaffenburg when his machine struck the bomb and triggered it. Police said they weren't sure yet what type of bomb it was. "The explosion seems to have been too small for it to have been an aircraft bomb," a police spokesman said.

23rd October 2006

WWII bomb injures 17 at Hattingen construction site



Seventeen people were injured on Friday when a construction crew unwittingly detonated a buried World War II-era bomb in Hattingen.

An excavator apparently drove over a 250-kilogramme (550 pound) American bomb, damaging surrounding buildings. Most of the injured suffered auditory trauma from the blast, and the excavator operator suffered injuries to his hands, police in the German state of **North Rhine-Westphalia** said.

"The hole was astoundingly small for such a large bomb full of so many explosives," Armin Gebhard, head of the Arnsberg department for military ordnance removal, told *The Local*. "But of course it damaged all the surrounding buildings too. We are really happy it wasn't worse."

19th September 2013

BBC NEWS

World War II bomb kills three in Germany



A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

The blast happened an hour before the defusing operation was due to start.

Officials said the three men who died were experienced sappers, or combat engineers, who over 20 years had defused up to 700 bombs.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

2nd June 2010



June 2006

Unexploded Second World War bomb discovered under Somerset footpath

By Western Daily Press | Posted: January 21, 2014



The unexploded bomb was found in Somerset.

Comments (8)

Report this article

An unexploded bomb dropped in Britain during the Second World War has finally been discovered – underneath a popular footpath in Somerset.

21 August 2014 Last updated at 15:01

Unexploded WW2 bomb found at Kenfig Pool, Bridgend



Dean Smith believes the shell was made in Germany

Bomb experts have been called to a south Wales nature reserve after an unexploded World War Two shell was discovered by a walker in Bridgend.

Dean Smith, 38, of Pyle, was walking near Kenfig Pool on Saturday when he saw a fin sticking out of the sand.

He reached down to pick it up, but ending up falling and landed with the 25-long (0.6m) bomb on top of him.

The site has been cordoned off by police and the Royal Logistics Corps will carry out a controlled explosion.

Related Stories

'Panic' as dog nearly thrown grenade

WW2 bomb found at wind farm exploded

WWII bomb found in kitchen cupboard

Mortar thought to be from WWII found on Oshawa's Camp-X grounds

August 24, 2016 | 5:42 am



What is believed to be a World War II mortar has been discovered in south Oshawa. A man out in Intrepid Park, the site of the Camp-X Second World War training grounds, discovered the round with his metal detector on Tuesday evening. Durham police are held the scene overnight awaiting military officials from Trenton to come and properly detonate the mortar.

Unexploded bomb found in farmer's field

17 May 2010



A live Second World War mortar shell was blown up by Army experts after a farmer found it in his field. The discovery was made in the field alongside the A20 between Folkestone and Dover.

The mortar shell, which was around a foot long and 3in in diameter, was around 50ft from the main road.

The farmer alerted police and PC Trevor Moody and PCSO Michelle Brady went to the field.

PC Moody contacted the Army who sent in a bomb disposal unit.

An Army officer confirmed the live shell was from the Second World War and was packed with high explosives.

They moved it a safe distance away from the A20 and carried out a controlled explosion.

PC Moody said: "Given that we live in an area that saw much action during the Second World War, it is not uncommon for us to be alerted about unexploded bombs."

The incident was on Thursday.

Click here for more news from Kent.

Royal Navy bomb disposal experts remove a World War Two shell discovered in a nature reserve

By VALERIE EDWARDS FOR MAILONLINE
PUBLISHED: 01:29, 13 January 2016 | UPDATED: 09:51, 13 January 2016



338 shares

A World War Two bomb was reportedly found at Efford Nature Reserve in Plymouth after a member of the public was metal detecting and partially dug it up.

The Royal Navy Bomb Disposal team was called in to remove the bomb and police have closed off Military Lane, with the possibility of Military Road also being closed.

Police were called at around 1.30pm yesterday after what appeared to be a shell was discovered and partially dug up near Military Lane, Efford.



Holiday beach cordoned off after landslide sends more than a THOUSAND Second World War bombs and rockets tumbling onto the sands

• Bad weather led to ground movement which exposed the huge arsenal at Mappleton, East Riding

• A dog walker stumbled across the deadly find on Saturday and 15 controlled explosions were carried out

• Rockets, mortar bombs and 25-pounder bombs were recovered after they were fired into the cliffs by RAF aircraft during the war

• Most of the devices were dummy rounds used for bombing practice but contain enough explosives to cause terrible injuries



Bomb Beach Alley: Rockets were found after a landslide on Mappleton beach in 2012

Army bomb disposal team called to Blacksole Bridge in Herne Bay

by Aidan Barlow alanbarlow@thetmg.co.uk | 08 July 2015

It was like a scene from Dad's Army when Army bomb disposal experts found wartime explosives made by the Home Guard in makeshift bottles.

A team was called to the Blacksole Bridge in Herne Bay after the wartime bombs were found.

The team from the Royal Logistics Corps set up a 30 metre exclusion zone for pedestrians around the railway embankment after the suspected homemade phosphorous bombs were found.



The scene at Blacksole Bridge after wartime explosives were found in the railway cutting

Unexploded bomb found in Axminster

Update: The bomb disposal unit has made the device safe and the road has re-opened

Six homes have been evacuated today after the discovery of an unexploded device in Axminster.

A Royal Navy bomb disposal team have been called to the scene after a 'historic German device' was discovered in a garden.

Police have set up a 20m cordon around the garden in Alexandra Road and evacuated homes in the surrounding area as a precaution.

Storms and floods unearth unexploded wartime bombs

By Claire Marshall
BBC environment correspondent

There has been a dramatic increase in the number of wartime bombs unearthed because of the winter storms and flooding.

Bomb disposal teams in the South West have dealt with double the number of unexploded ordnance than in the same period last year.

Since mid December, the Royal Navy's Southern Dive Unit has recovered or disposed of 244 items of ordnance.

During the same period last year, they dealt with just 108 items.

Almost 70 years after the end of WWII, one legacy of that conflict continues to turn up on beaches and harbours around Britain.

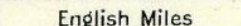
Unexploded shells, bombs and mines continue to be discovered every year, and the Royal Navy's Southern Dive Unit is tasked with making these devices safe.

Its area of responsibility stretches for some 2,250km (1,400 miles). It begins from the highwater mark in Hull and proceeds seaward to the territorial limit, and then runs clockwise around the British Isles - including the Isle of Wight, Channel Islands, and Isles of Scilly - to finish in Liverpool.

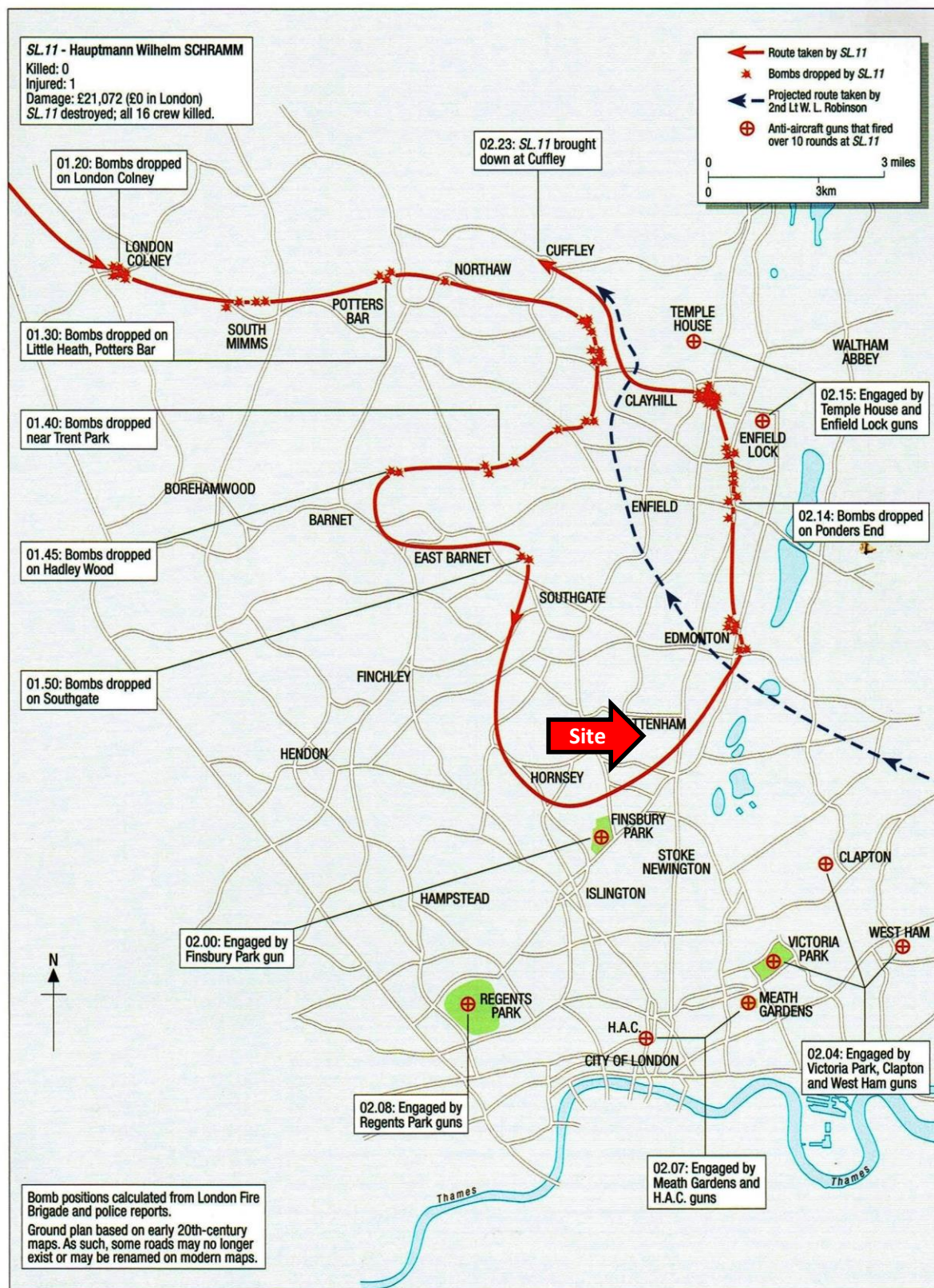
Related Stories

Ancient trees revealed by storms

Land Service Ammunition (LSA) resulting from historic military activity is commonly encountered across the UK by the public and construction industry alike. Such finds are much more common in rural areas than in urban environments, and can often be anticipated in areas such as former RAF stations or ranges. However, many such items are encountered entirely by surprise where the landowner or developer has no knowledge of any previous military use of the land.



The 2/3 September 1916 raid on London: SL.11 (Hptmn Wilhelm Schramm)



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Project: Willan Road, Tottenham

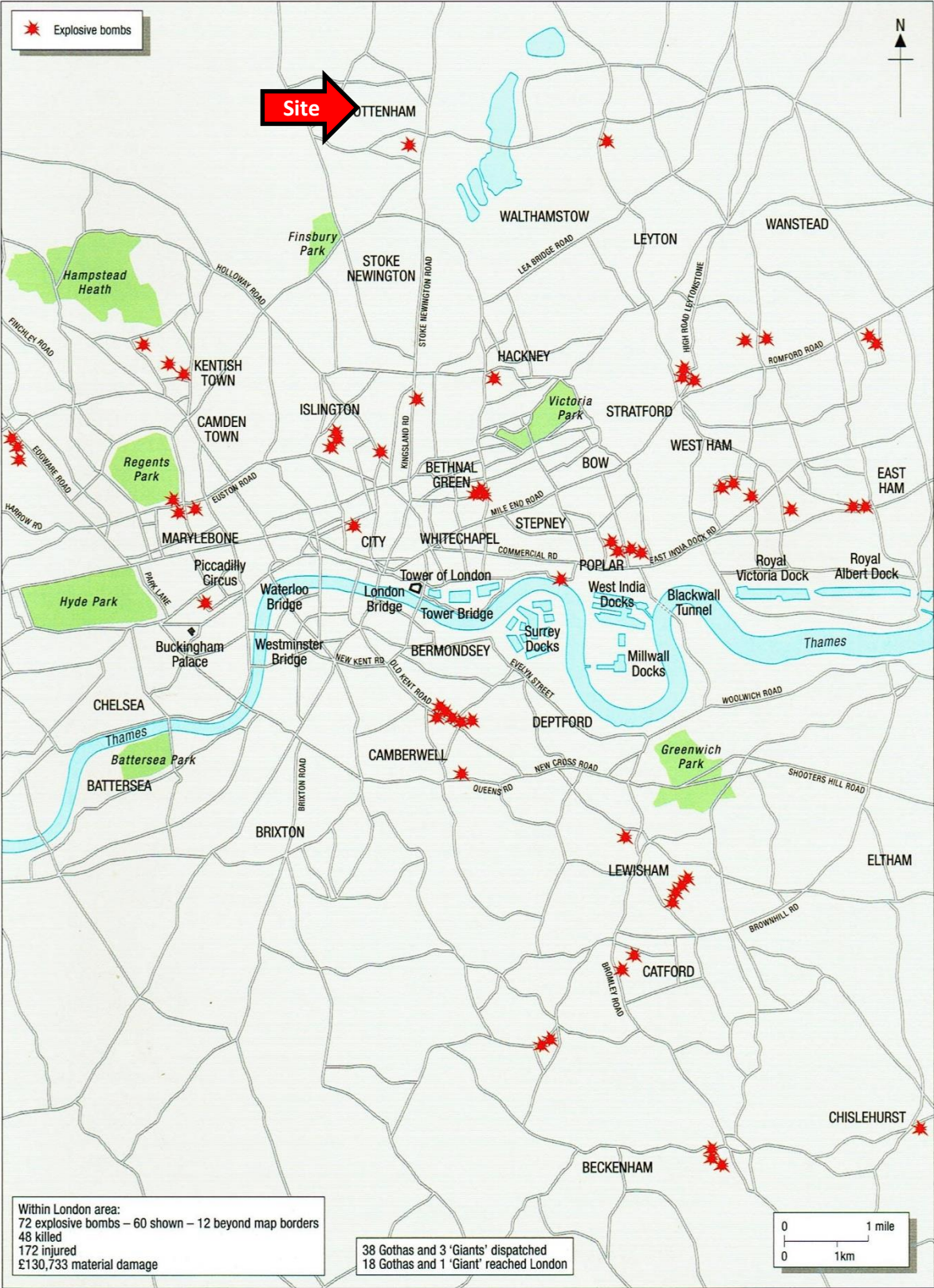
Ref: DA11350-00

Source: Castle, I., London 1914-17: The Zeppelin Menace, Osprey Publications Ltd., 2008

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The 19/20 May 1918 raid



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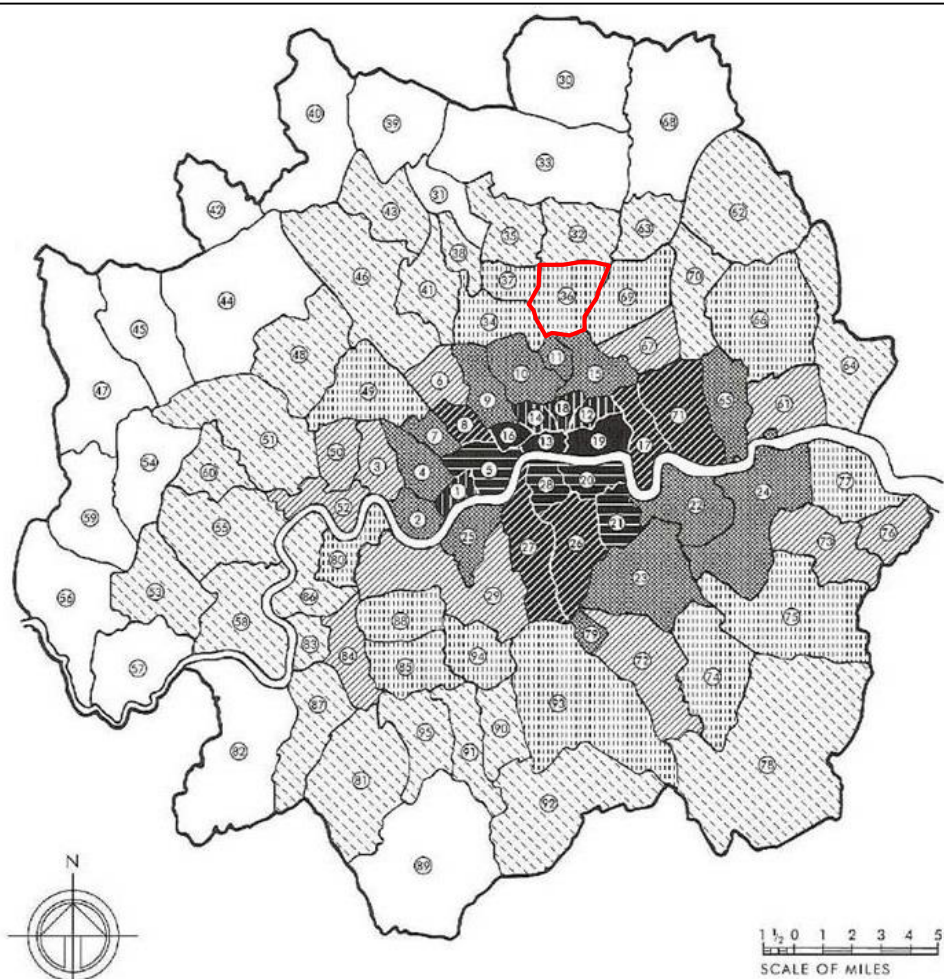
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Source: Castle, I., London 1914-17: The Zeppelin Menace, Osprey Publications Ltd., 2008

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No. OF BOMBS PER 1,000 ACRES

	OVER 600		300 - 399		100 - 149
	500 - 599		200 - 299		50 - 99
	400 - 499		150 - 199		UNDER 50

1 Chelsea	25 Battersea	49 Willesden	72 Beckenham
2 Fulham	26 Camberwell	50 Acton	73 Bexley
3 Hammersmith	27 Lambeth	51 Ealing	74 Bromley
4 Kensington	28 Southwark	52 Brentford and Chiswick	75 Chislehurst and Sidcup
5 Westminster	29 Wandsworth	53 Feltham	76 Croyford
6 Hampstead	30 Cheshunt	54 Hayes and Harlington	77 Erith
7 Paddington	31 East Barnet	55 Heston and Isleworth	78 Orpington
8 St. Marylebone	32 Edmonton	56 Staines	79 Penge
9 St. Pancras	33 Enfield	57 Sunbury	80 Barnes
10 Islington	34 Hornsey	58 Twickenham	81 Epsom and Ewell
11 Stoke Newington	35 Southgate	59 Yiewsley and West Drayton	82 Esher
12 Bethnal Green	36 Tottenham	60 Southall and Norwood	83 Kingston on Thames
13 City of London	37 Wood Green	61 Barking	84 Maiden and Coombe
14 Finsbury	38 Friern Barnet	62 Chigwell	85 Merton and Morden
15 Hackney	39 Potters Bar	63 Chingford	86 Richmond
16 Holborn	40 Elstree	64 Dagenham	87 Surbiton
17 Poplar	41 Finchley	65 East Ham	88 Wimbledon
18 Shoreditch	42 Bushey	66 Ilford	89 Banstead
19 Stepney	43 Barnet U.D.	67 Leyton	90 Baddington and Wallington
20 Bermondsey	44 Harrow	68 Waltham Holy Cross	91 Carshalton
21 Deptford	45 Ruislip and Northwood	69 Walthamstow	92 Coulsdon and Purley
22 Greenwich	46 Hendon	70 Wanstead and Woodford	93 Croydon
23 Lewisham	47 Uxbridge	71 West Ham	94 Mitcham
24 Woolwich	48 Wembley		95 Sutton and Cheam



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Source: The London Metropolitan Archives





London- Tottenham
Water treatment works and reservoir
TN 81



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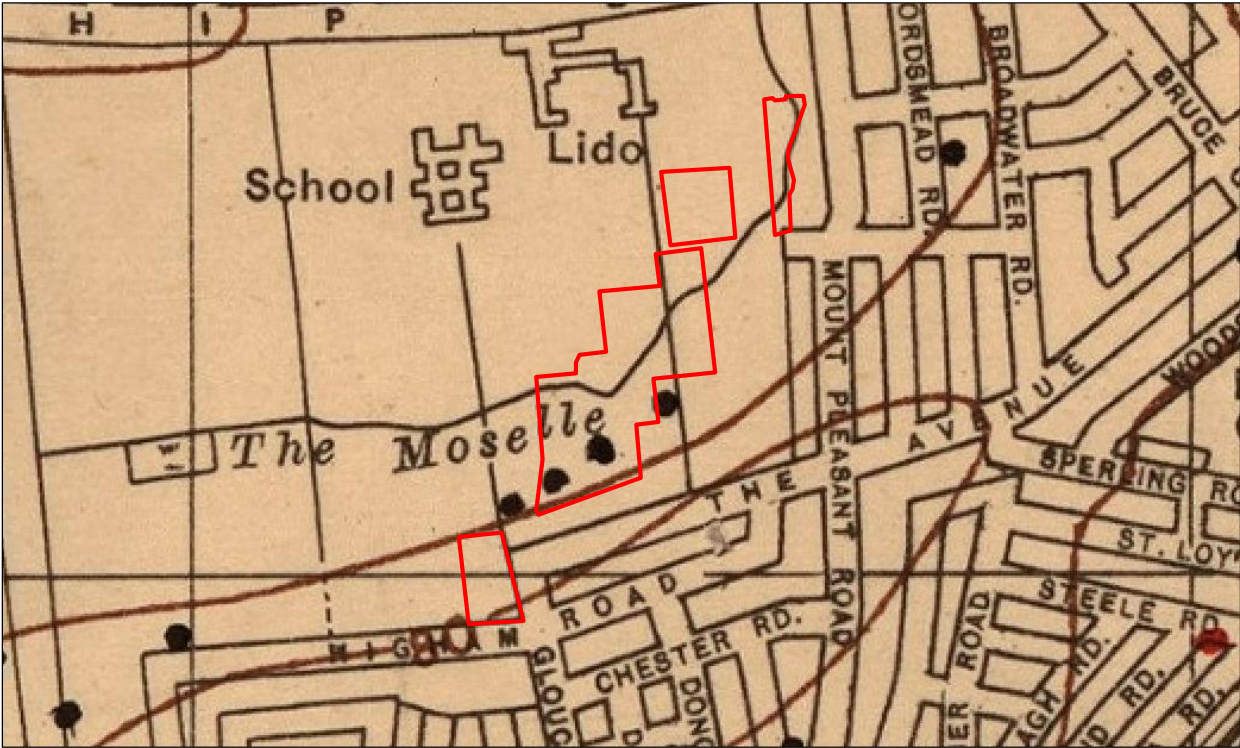
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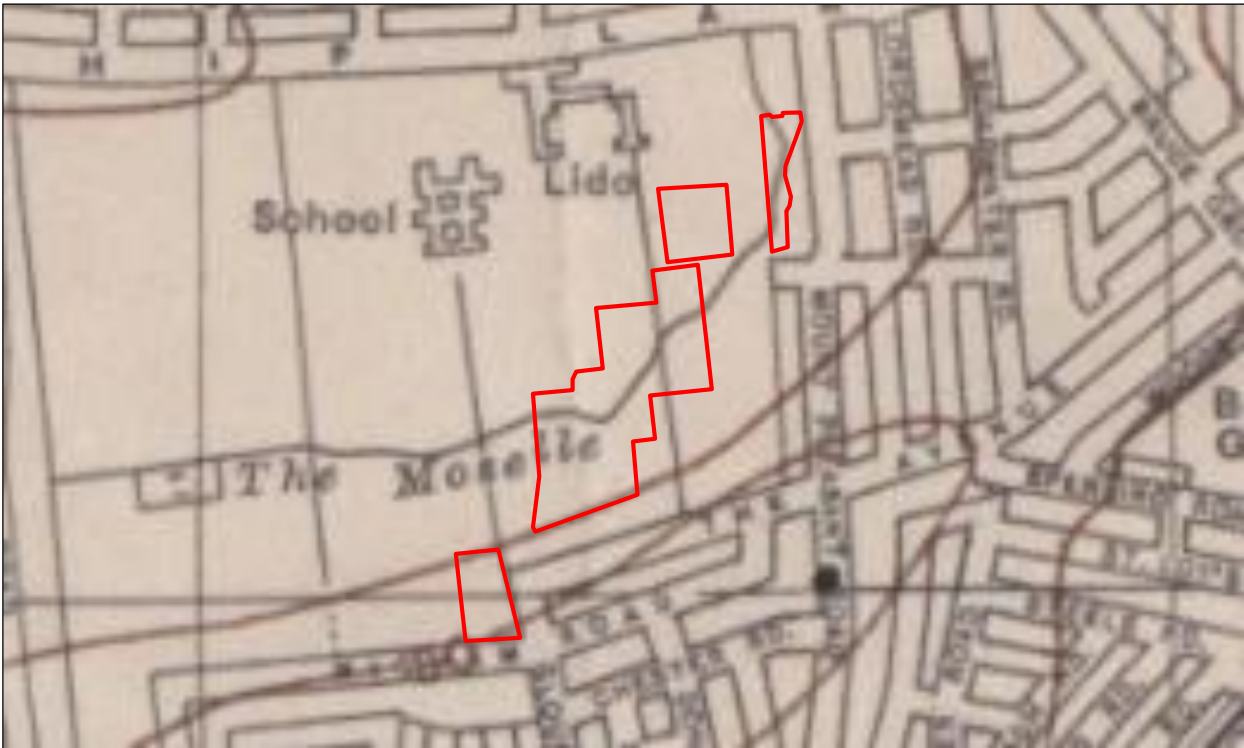
Source: Nigel J. Clarke, "Adolf Hitler's Home Counties Holiday Snaps"



Night Bombing up to 7th October 1940



7th October 1940- 6th June 1941



  Recorded bomb strike



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Source: The National Archives, Kew

 Approximate site boundary



7th -14th October 1940



28th October- 4th November 1940



- Recorded HE bomb strike
- Recorded incendiary bomb shower
- Recorded UXB strike
- Recorded oil bomb strike

Key to weekly map symbol colours
Monday - Brown Friday - Green
Tuesday - Vermilion Saturday - Violet
Wednesday - Blue Sunday - Yellow
Thursday - Black



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 **Approximate site boundary**





V-1 flying bomb



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 **Approximate site boundary**





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Source: **Haringey Archives**

— Approximate site boundary



Date	Occ No.	Time	Type of Bomb	Location	Casualties.	Damage.
18.9.40.	143	2220	3 H.E.	Lordship Recreation Ground.	NIL	NIL
(cont.)	144	19.9.40.				
	145	0250	I.B.	Marden Road.	NIL	NIL
	146	2321.	H.E.	Dowsett Road near High Road.	NIL	Damage to backs of houses
	147	2325	--	53, Sherringham Avenue	NIL	NIL
		----	---	-----	---	----- Remarks. Later combined with 138

Date	Occ.No.	Time	Type of bomb	Location	Casualties	Damage	Remarks
Saturday	254	0820	Reported Exploded H.E. & Unexploded AA shell.	Tottenham Gas Works, Willoughby Lane.	Nil	Nil	
5.10.40	255	0930	Reported Unexploded AA shell	27, Lansdowne Road	Nil	Nil	No trace on investigation.
	256	1955	Exploded AA shell	Front 129, Gloucester Road	Nil	Nil	To dwelling house and gas m.
6.10.40.	257	1138	Reported Unexploded H.E.	Allotments, Lordship Lane			Very large calibre
		1955, 5th.	Fell approx	Recreation ground, rear Gloucester Road	Nil	Nil	Exploded 15.10.40.
	258	2110	Reported Unexploded AA shell	Rear 9-11, Reynardson Road.	Nil	Nil	
	259	1200	Reported Unexploded AA shell	Public Trenches, rear St. Ignatius School.	Nil.	Nil.	



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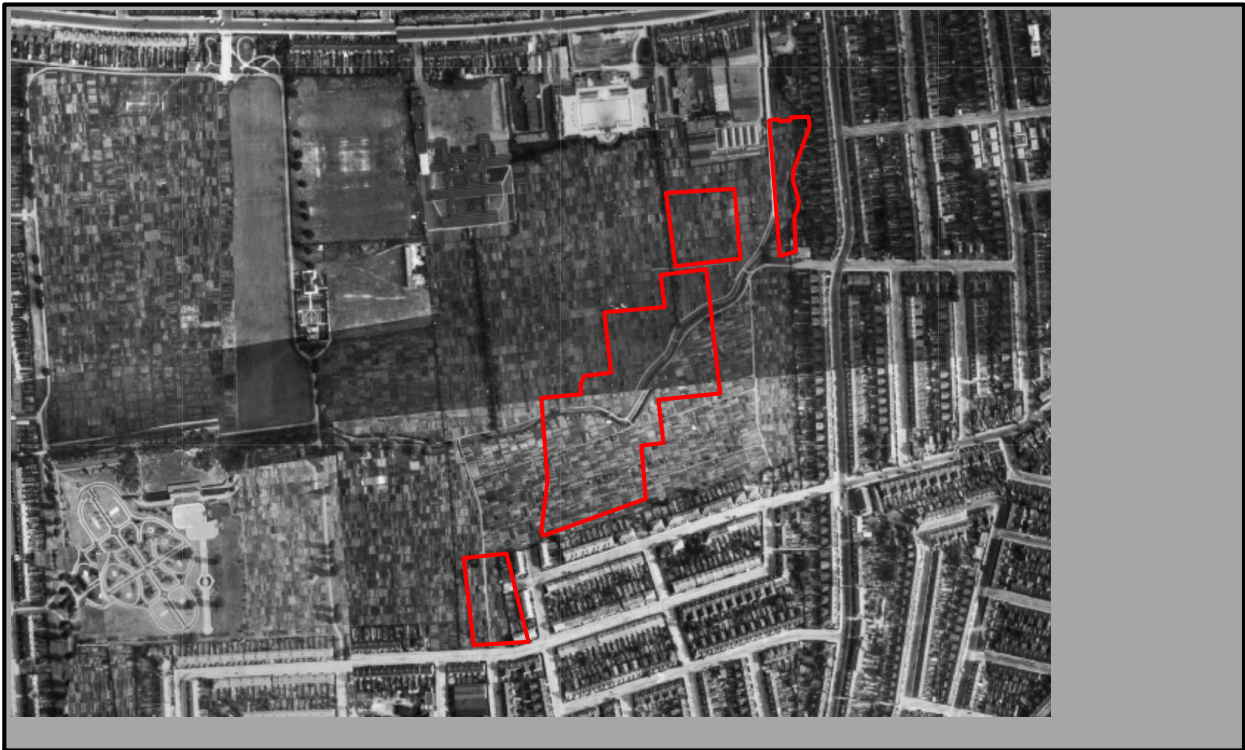
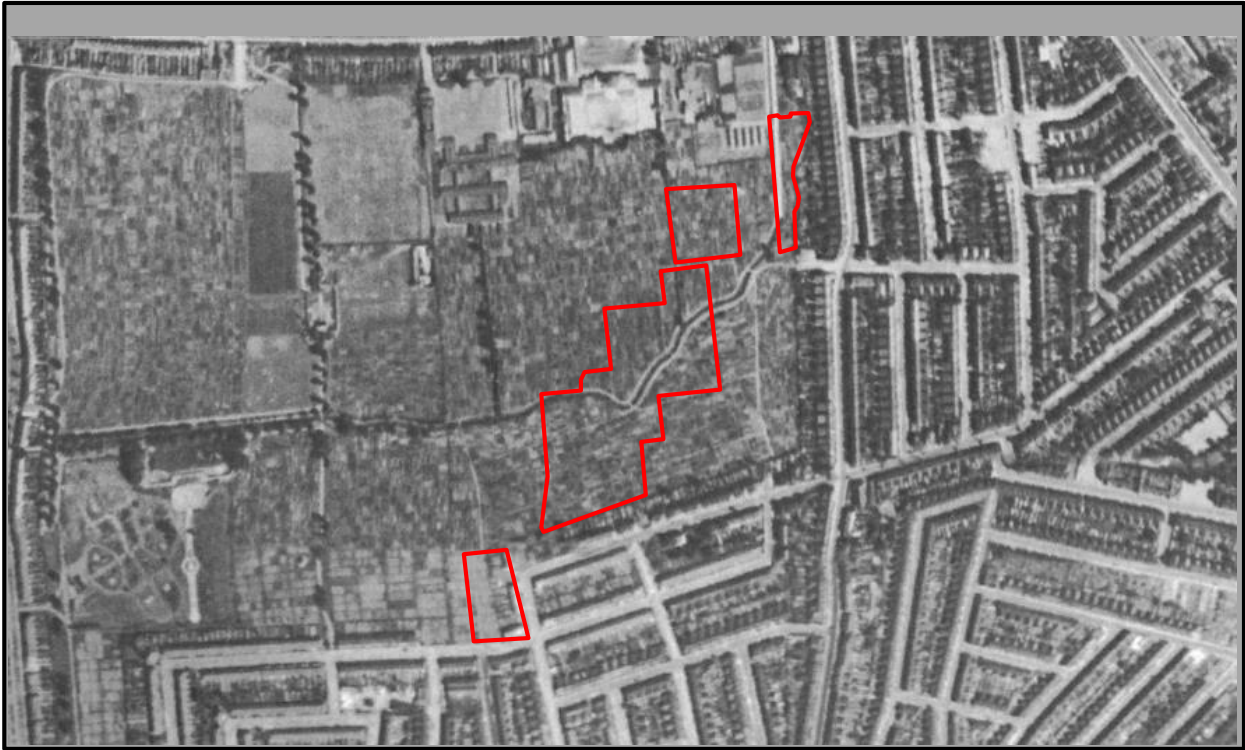
Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: London Metropolitan Archives

 **Approximate site boundary**





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Source:

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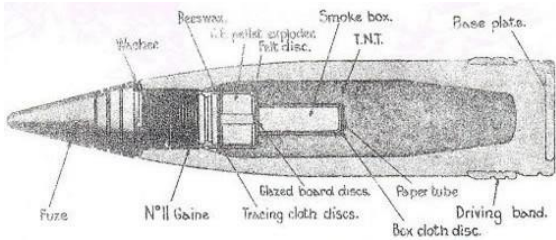
Source: National Monuments Record Office (Historic England)

 **Approximate site boundary**



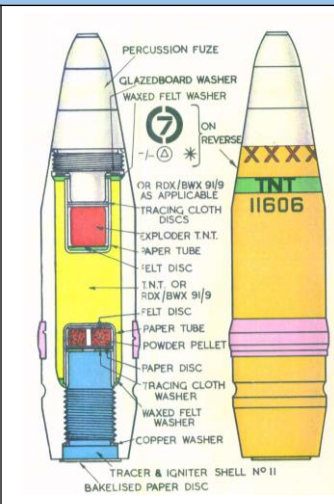
3.7 Inch QF Anti-Aircraft Projectile

Projectile Weight	28lb (12.6 kg)
Explosive Weight	2.52lbs
Fuze Type	Mechanical Time Fuze
Dimensions	3.7in x 14.7in (94mm x 360mm)
Rate of Fire	10 to 20 rounds per minute
Use	The 3.7in AA Mks 1-3 were the standard Heavy Anti-Aircraft guns of the British Army.
Ceiling	30,000ft to 59,000ft



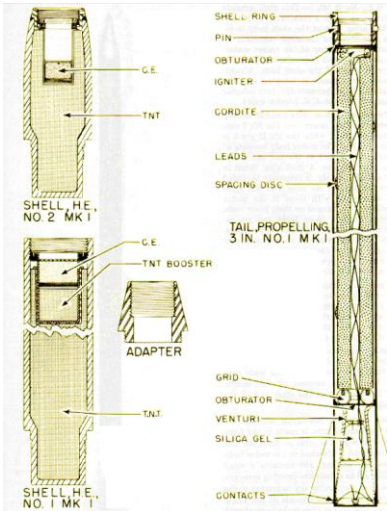
40mm Bofors Projectile

Projectile Weight	1.96lb (0.86kg)
Explosive Weight	300g (0.6lb)
Fuze Type	Impact Fuze
Rate of Fire	120 rounds per minute
Projectile Dimensions	40 x 180mm
Ceiling	23,000ft (7000m)
Remarks	Light quick fire high explosive anti-aircraft projectile. Each projectile fitted with small tracer element. If no target hit, shell would explode when tracer burnt out. Designed to engage aircraft flying below 2,000ft



3in Unrotated Projectile (UP) Anti-Aircraft Rocket ("Z" Battery)

HE Projectile Weight	3.4kg (7.6lb)
Explosive Weight	0.96kg (2.13lb)
Filling	High Explosive – TNT. Fitted with aerial burst fuzing
Dimensions of projectile	236 x 83mm (9.29 x 3.25in)
Remarks	As a short range rocket-firing anti-aircraft weapon developed for the Royal Navy. It was used extensively by British ships during the early days of World War II. The UP was also used in ground-based single and 128-round launchers known as Z Batteries. Shell consists of a steel cylinder reduced in diameter at the base and threaded externally to screw into the shell ring of the rocket motor



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Source: **Various sources**

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All Risk Areas:

- Site Specific Unexploded Ordnance Awareness Briefings to all personnel conducting intrusive works
- UXO Risk Management Plan

Medium Risk Area:

- Unexploded Ordnance (UXO) Specialist Presence on Site to support shallow intrusive works
- Intrusive Magnetometer Survey of all Borehole and pile locations down to a maximum bomb penetration depth



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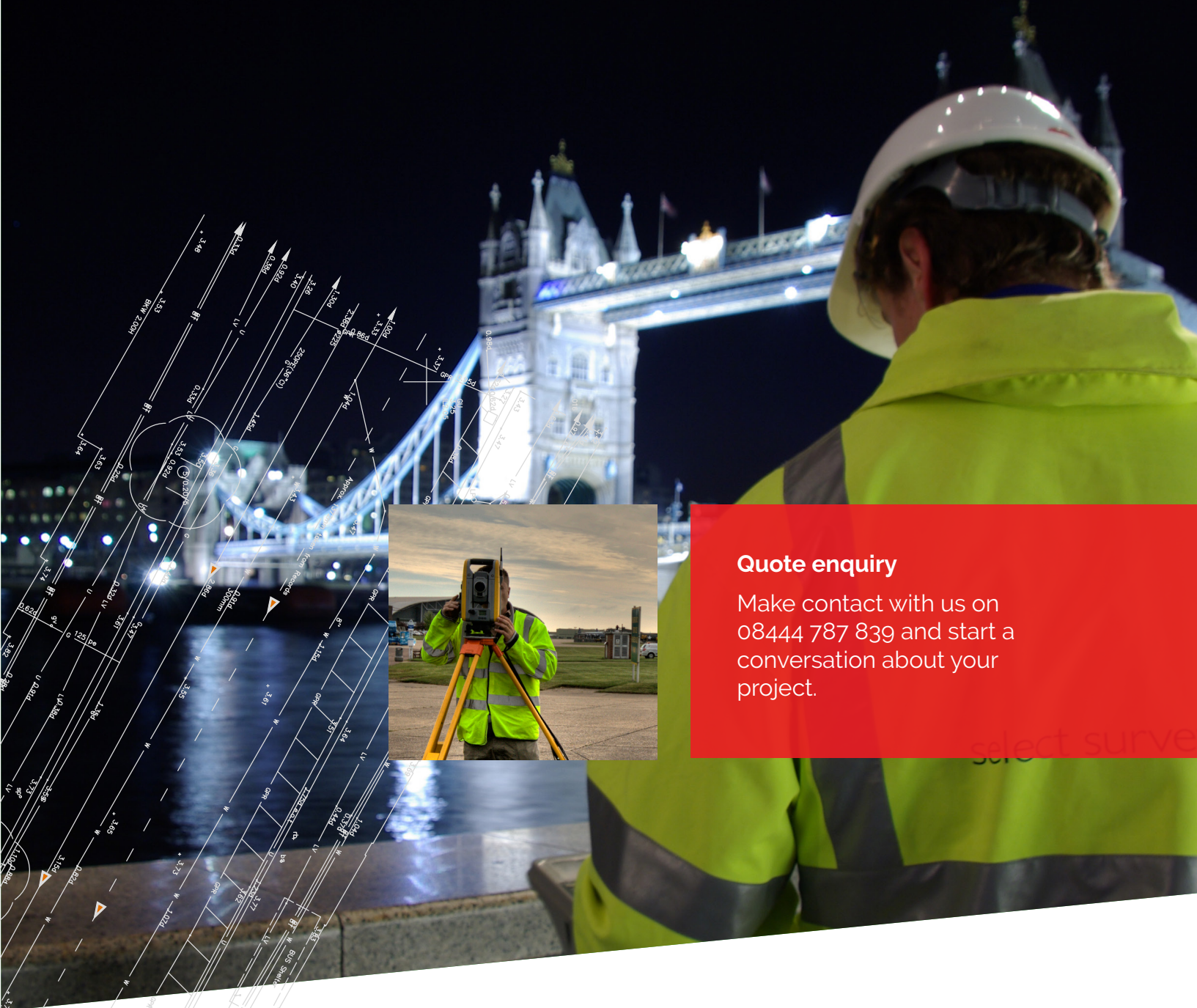
Project: **Willan Road, Tottenham**

Ref: **DA11350-00**

Source: Google Earth™ Mapping Services

 **Approximate site boundary**

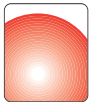




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Appendix 4



dB Levels of Proposed Plant (BS5228)

Noise Sources	10m level dB(A)	L _{WA} - dB	No	% on	Adjusted L _{WA} - dB
Demolition					
Bulldozers	80	108	1	60%	106
Cranes and hoists	77	105	1	60%	103
Cutters, drills and small tools	75	103	10	50%	100
Crushers	84	112	1	40%	108
360° excavators	86	114	1	50%	111
Generators	72	100	4	100%	100
Hydraulic benders and cutters	79	107	1	50%	104
Scaffolding and mobile hydraulic access platforms	70	98	2	40%	94
Shovel	79	107	1	50%	104
Total:					115
Basement Excavation and Piling					
Bulldozers	80	108	1	60%	106
Cranes and hoists	77	105	1	60%	103
Crushers	84	112	1	40%	108
360° excavators	86	114	1	50%	111
Generators	72	100	4	100%	100
Hydraulic benders and cutters	79	107	1	50%	104
HGV	86	114	5	50%	111
Piling rigs	83	111	1	100%	111
Shovel	79	107	1	50%	104
Water Pump	71	99	2	100%	99
Total:					116
Substructure					
Bulldozers	80	108	1	40%	104
Compaction Plant	78	106	1	50%	103
Cranes and hoists	77	105	1	60%	103
Cutters, drills and small tools	75	103	10	50%	100
360° excavators	86	114	1	20%	107
Generators	72	100	4	100%	100
Hydraulic benders and cutters	79	107	1	50%	104
HGV	86	114	5	50%	111
Piling rigs	83	111	1	50%	108
Ready-mix concrete lorry	86	114	10	5%	101
Concrete pump	85	113	10	10%	103
Shovel	79	107	1	25%	101
Water Pump	71	99	2	100%	99
Total:					116
<i>All noise sources ascertained from BS5228 library</i>					