

Stage 1 Preliminary Explosive Ordnance Risk Assessment

Project: Ducie Street, Manchester

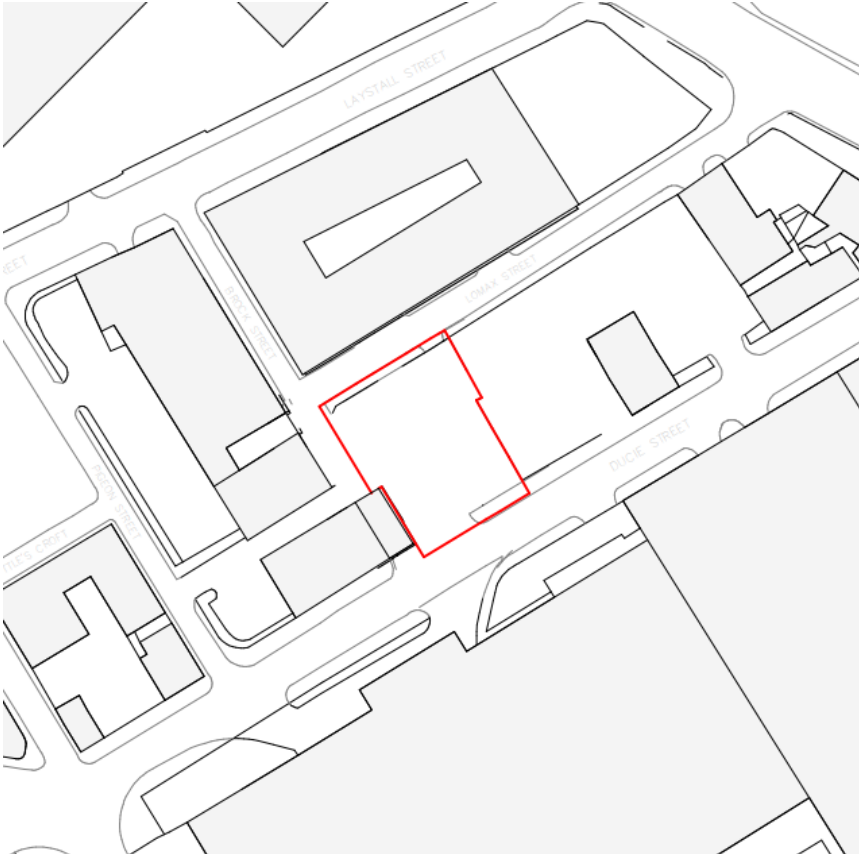
Client: Earth Environmental & Geotechnical Ltd

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Conclusions	There is a potentially elevated likelihood of explosive ordnance encounter during the proposed development works.	
	Explosive ordnance poses a Low Risk to the proposed SI works	
Recommendation		
Development works	Stage 2 Detailed Explosive Ordnance Risk Assessment (DRA) to elucidate the risk to the development works.	To receive a Stage 2 DRA quotation: info@impartialassessments.com +44 (0) 207 126 8164
SI works	None recommended. UXO Safety Awareness Briefing to all personnel conducting SI works would be considered prudent. Note, the possibility of a UXO encounter cannot be completely ruled out at desktop stage.	

The Site



British National Grid Ref:
SJ 85015 98260

Site Address:
Ducie Street, Manchester,
M4 6DE

Note, the Ducie Street site will subsequently be referred to as the Site.

Introduction	
Introduction	A preliminary risk assessment (PRA) is the first stage of the UXO (unexploded ordnance) / EO (explosive ordnance) risk management process. It is a qualitative screening exercise to assess the likelihood of encountering EO during ground works at a given site. The assessment considers the basic factors that affect the likelihood of buried EO being present at a given site today and the likelihood it will be encountered during the proposed works.
Assessment methodology	This desktop risk assessment has been researched and written by a dedicated EO risk analyst and is produced in accordance with CIRIA C681 (2009) and C785 (2019) guidelines on UXO risk assessment. As such, the assessment considers the following five factors: ▶ Site location and Site history / occupancy ▶ Wartime UXO: German bombing, German shelling, and British and Allied anti-aircraft weaponry fire ▶ Domestic military activity: British and Allied armed forces activity during wartime and peacetime ▶ Mitigating Factors ▶ Extent of the proposed ground works Note, the likelihood of EO initiation / detonation and consequence(s) of EO initiation / detonation are assessed at Stage 2, not Stage 1. The numerical preliminary risk rating calculation included within this PRA is a unique Impartial Assessments Ltd (IAL) methodology that makes for a transparent and accountable risk assessment process.
Information sources	This assessment draws on preliminary research utilising information sources immediately available to IAL at the time of writing. The availability of historical information will differ depending on the Site's location. As an absolute minimum, all IAL Stage 1 PRAs involve analysis of recent aerial photography, historic OS mapping, original WW2 bombing density records and our PIEO (potential indicators of explosive ordnance) GIS map. The PIEO map plots our vast database of locations and incidents of interest.
Stage 1 objective	The main objective of a Stage 1 PRA is to confirm whether or not further research is required to verify the EO risk. If a low risk cannot be confirmed at Stage 1, a Stage 2 Detailed Risk Assessment (DRA) will be recommended.
The Site and Proposed Works	
Current Site occupancy	Car park (hard surfaced). Post-WW2 constructed.
WW1-era / WW2-era Site occupancy (OS maps review)	Pre-WW1, the north half of the Site was occupied by four terraced houses with very small back yards fronting Lomax Street. The south half was occupied by two adjoining buildings fronting Ducie Street (likely of commercial use) and a small service yard with a few small shed or lean-to type structures. The residential and commercial yard areas will almost certainly have been covered by sett paving, as opposed to vegetation / bare earth. By 1932, the two buildings in the east had become adjoined. No change by 1938 (two years before WW2). By 1948, the three houses in the north had been demolished. The south half and eastern extent remained unchanged.
Risk mitigating factors	Ground Works: By 1970, a building (likely three storeys in height) had been constructed in the north half of the Site. This building was later extended into the south half. The foundation solution is not known, however shallow / traditional footings may have been used. Associated made ground / soil disturbance is likely to have been moderate. The risk associated with shallow buried EO has likely been mitigated. However, any deep buried German unexploded bomb (UXB) contamination could have persisted up to the present day. Explosive Ordnance Clearance (EOC): The likelihood of any military EOC activity affecting the Site is very low.
Proposed works	The proposed development is seven to eight storey residential building, comprising 41No. apartments. The development will require bored piles. The maximum depth of these intrusive works was unknown at the time of writing, however it can be confidently assumed that they will extend to a point beyond the maximum German bomb penetration depth. The preceding SI phase comprises 2No. cable percussive boreholes to a provisional depth of 25.0m and 4No. window sample boreholes to a depth of 5.0m bgl.

Enemy Action during WW1		
UXO source	Relevance	Details
German aerial bombing	Irrelevant	n/a
German naval shelling	Irrelevant	n/a
Enemy Action during WW2		
German aerial bombing		
Indicator	Assessment	
Bombing density	Wider Area: The Site is located within the (WW2-era) County Borough of Manchester which sustained 27.0 bombs / 1,000 acres, a moderate bombing density.	
	Locally: The county borough was very large and therefore the bombing density figure above is not an accurate representation of the Site-specific bombing density. The Site is located within the city centre, where the bombing density was higher.	
Confirmed Luftwaffe bombing targets	Original Luftwaffe target maps of the borough identify several bombing targets within 1km of the Site, the closest of which (London Road Goods Station) was situated approximately 190m south-west of the Site.	
Potential secondary / opportunistic targets	n/a	
British bombing decoys sites	None within a significant radius of the Site. Closest was >7km to the south-east.	
Evidence of bomb damage (historic OS mapping)	Evidence of potential severe bomb damage identified on Site.	
Evidence of bombing incident	None.	
German land-based (French coast) artillery shelling		
Is the Site located within an area subjected to shelling?	No	

Domestic Military Activity		
Source of EO	Relevance	Details
WW1 anti-aircraft artillery fire	Potentially	Anecdotal evidence of AA guns defending Manchester located.
WW2 anti-aircraft artillery fire	Relevant	Numerous (>30No.) heavy anti-aircraft (HAA) batteries were active within range of the Site. Light anti-aircraft (LAA) gun positions may have been temporarily deployed within range of the Site. Luftwaffe activity in the region was frequent and heavy. Consequently, these guns probably expended a vast quantity of ammunition over the wider area.
Military bases / installations	Irrelevant	n/a
Military training areas / weapons ranges	Irrelevant	n/a



Munitions or explosives factories	Irrelevant	n/a
Munitions storage depots	Irrelevant	n/a
Defence fortifications / other measures	Irrelevant	n/a
WW2 minefields	Irrelevant	n/a
Wartime requisition	Irrelevant	n/a
WW2 Home Guard activity	Potentially	Note, although soldiers of the 50 th Lancashire (Ancoats) Battalion would have been active locally, the Site is highly unlikely to have been accessed by armed troops.

Key Findings

German UXO:	▶ Manchester experienced four major and multiple medium and smaller scale raids during WW2. The Manchester / Salford / Stretford conurbation was the eleventh most heavily bombed urban area in Britain. ▶ The bombing density figure for the wider county borough is moderate, however the study area's city central position close to known Luftwaffe targets indicates it experienced a higher bombing density. It is quite possible therefore that a UXB was released over and struck the Site. ▶ At the time, the Site was entirely developed, however pre-WW2 buildings in the north were demolished by the late 1940s, probably indicating severe bomb damage. Any subsequent UXB strike to ruins could have easily gone unreported, its entry hole obscured within rubble / debris. ▶ The risk from deep buried German UXBs has not been significantly mitigated post-war and the planned piling works expose the project to a potential UXO encounter such as this, at depth (heavyweight high explosive bomb). ▶ The proposed SI works will disturb a very small volume of made ground / soil within the zone of elevated UXO contamination risk, when compared to the subsequent piling works. ▶ There is a far smaller chance of encountering UXO within the southern third of the Site.
British / Allied EO:	▶ No evidence of military activity affecting the Site found and none is likely to have occurred. ▶ It is quite possible that an unexploded British AA shell struck the Site during WW2. Had it impacted ruins unseen, the incident could have easily gone unreported. ▶ However, any such UXO is highly likely to have been removed from Site when the probable ruins were cleared.

Preliminary (Indicative) Risk Calculation

The preliminary risk rating calculation involves three elements:

- ▶ The likelihood of EO contamination (Site location and history)
- ▶ The likelihood of EO remaining on Site today (the extent of any risk mitigating factors)
- ▶ The likelihood of EO encounter during the proposed works (the degree of proposed soil disturbance)

Each factor is numerically rated (**1 to 5**). For 'likelihood of EO contamination' and 'likelihood of EO encounter', **one** is the lowest likelihood. For 'likelihood of EO remaining', **five** is the lowest likelihood.

When added together, a final score of **eight or more** triggers the recommendation of a Stage 2 DRA.

Proposed Works	Contamination	Risk Mitigation	Proposed Soil Disturbance	Risk Rating Calculation	
	1 = lowest 5 = highest	1 = highest 5 = lowest	1 = lowest 5 = highest		
SI works	3	3	1	3+3+1=	7
Development works	3	3	3	3+3+3=	9

Further research is required to assess the degree of severity and timing of the probable bomb damage on Site and analyse the positions of individual bomb strikes in relation to the Site:

Stage 2 Detailed Explosive Ordnance Risk Assessment

IAL has exercised all reasonable care, skill and due diligence in preparing this risk assessment. However, a low-risk conclusion at Stage 1 does not mean 'no risk'. For example, it is impossible to identify locations where members of the public have previously buried unwanted (often inherited) EO on private land (such as residential back gardens). Such EO contamination is not uncommon.

IAL cannot be held responsible for any inaccuracies or omissions within any records / information relied upon to conduct this risk assessment.

IAL is not liable for any relevant records / information that has become available subsequent to this risk assessment's issue date.

IAL cannot accept liability for subsequent changes to Site conditions that could affect the risk level.

At the time of writing, the relevant UK construction industry guidelines on explosive ordnance risk assessment (CIRIA) were adhered to. Subsequent revisions to these guidelines or new guidelines / legislation may render part(s) of this report obsolete. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.