DeTrafford

# PHOENIX WORKS, CORNBROOK, MANCHESTER

## Phase 1 Preliminary Risk Assessment Report

11690(1)
NOVEMBER 2020

CONFIDENTIAL

DeTrafford

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**VERSION 1: CONFIDENTIAL**

**PROJECT NO. 70075977**

**OUR REF. NO. 11690(1)**

**DATE: NOVEMBER 2020**

DeTrafford

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## Phase 1 Preliminary Risk Assessment Report

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# QUALITY CONTROL

| Issue/revision | Version 1 | Version 2 |
|---|---|---|
| Remarks | Version 1 | Final after client comments |
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| Signature | | Gallagher, Paula (UKPJG003) 2020.11.25 14:56:47 Z |
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| Project number | 70075977 | 70075977 |
| Report number | 11690 | 11690(1) |
| File reference | 70075977 - 11690 | 70075977 – 11690(1) |

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# 1 INTRODUCTION

## 1.1 AUTHORISATION

WSP UK Ltd (WSP) was instructed by DeTrafford ('the client') to undertake a Phase 1 Preliminary Risk Assessment for the area referred to as Phoenix Works, on Ellesmere Street, Cornbrook, Manchester, M15 4JY, ('the site'). A site location plan is presented on Figure 1. This report has been undertaken in accordance with our proposal, dated 10 September 2020.

## 1.2 BACKGROUND INFORMATION

WSP understands the site is owned by the client and is proposed for redevelopment into a high rise (part 11 and part 13 storey) residential building with mixed ground floor use comprising residential dwellings, car parking, commercial premises and other ancillary use. The designs do not include a basement or any other sub-surface structures. WSP were provided with a Site Location Plan (20098-CWA-B1-XX-DR-A-7000) and a Ground Floor General Arrangements Plan (20098-CWA-B1-ZZ-DR-A-2000), which are both are presented in Appendix A.

The Phoenix Works site is one of several similar development sites (high rise apartment buildings, both completed and under construction / proposed) in the area bounded by Ellesmere Street and Chester Road in the Masterplan. Immediately surrounding the site are the following developments:

- Gallery Gardens to the south west.
- Sky Gardens to the south.
- St Georges Gardens and City Gardens to the south east / east.
- Roof Gardens to the east.

The developmental layout of the Manchester Gardens Masterplan is presented in the excerpt below, with the Phoenix Works approximate site boundary identified in red.

**Excerpt 1 - Masterplan and Phoenix Works Site Boundary**

## 1.3 OBJECTIVES AND SCOPE OF WORK

The primary objective of the preliminary risk assessment is to identify potential development constraints associated with ground conditions and contamination.

The scope of works covered in this report are:

- A desk study, comprising a review of regulatory records, published geological and hydrogeological data, historical mapping, coal authority mapping and radon risk status information.
- Consultations with regulatory authorities (as appropriate).
- An initial unexploded ordnance (UXO) screen.
- A preliminary risk assessment of land quality, including the production of a conceptual site model.
- Comment on the potential for statutory liability, designation of contaminated land and comment on potential for third-party liability.
- Preliminary geotechnical advice and potential substructure solutions.

## 1.4 METHODOLOGY

This desk study and assessment have been undertaken with reference to the following guidance:

- Environment Agency's Land Contamination Risk Management (LCMR) Published 8 October 2020.
- Manchester City Council, Planning Guidance in Relation to Ground Contamination: Guidance Note for Applicants, Developers, Land-Owners and Consultants Version 6, dated September 2016.
- CIRIA C552 Contaminated land risk assessment A guide to good practice, dated 2001.

## 1.5 SOURCES OF INFORMATION

The information presented within this report has been collated from the following sources summarised in Table 1 overleaf.

**Table 1 – Sources of Information**

| Information Type | Details |
|---|---|
| Existing Reports | WSP has not been provided with any previous ground investigation reports for the Phoenix Works site. However, the following reports are associated with sites in adjacent / in close proximity to the subject site were provided and have been reviewed for relevant information:<br><br>Phase 1 Reports<br><br>Phase 1 Geo-environmental Site Assessment, Land off Bentinck Street. Resource and Environmental Consultants (REC) Issued July 2014 Ref 45459p1r1 (Sky Gardens).<br><br>Geo-environmental Site Assessment, Block E, Bentinck Street Industrial Estate, Resource and Environmental Consultants (REC) Issued September 2015 Ref 100156p1r0 (St Georges Gardens)<br><br>Geo-environmental Site Assessment, Block E2, Chester Road. Resource and Environmental Consultants (REC) Issued June 2017 Ref LA103785p1r0 (St Georges Gardens)<br><br>Gallery Gardens Manchester Phase 1 Preliminary Risk Assessment. LK Consult Group (LK Group) issued 28 July 2017 Ref LKC 1166 (Gallery Gardens).<br><br>Phase 2 Report and Remediation Strategies<br><br>Remediation Strategy Block E1 and E2 Chester Road Resource and Environmental Consultants (REC) issued June 2018 Ref 103785p4r0 (St Georges Gardens)<br><br>Gallery Gardens Manchester Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy. LK Consult Group (LK Group) issued January 2019 Ref LKC 17 1166 (Gallery Gardens) |
| Site Reconnaissance | Undertaken by WSP 15 October 2020 (Photographs of external areas included as Appendix B) |
| Public Information | ¡ Groundsure Report (reference GS-7178884) (included as Appendix C).<br>¡ British Geological Survey (BGS) mapping and logs (BGS Geo Index; accessed 15 October 2020) (copies of logs presented in Appendix D).<br>¡ The Coal Authority Interactive Map Viewer (accessed 15 October 2020).<br>¡ Online aerial imagery.<br>¡ A Zetica Unexploded Ordnance (UXO) Pre-Desk Study Assessment and Unexploded Bomb Risk Map (included as Appendix E).<br>¡ Manchester Bomb Map Record (The University of Manchester - https://luna.manchester.ac.uk/luna/servlet/view/search;JSESSIONID=e7dc7c75-920d-4b8a-89b2-dff74bc71acc?q=bomb%20damage&search=SUBMIT&QuickSearchA=QuickSearchA&sort=reference_number%2Ctitle&pgs=50&res=1&cic=maps002%7E1%7E1) |
| **Notes** | The report contains British Geological Survey materials ©NERC 2019 and Environment Agency information ©Environment Agency. |

## 1.6 CONFIDENTIALITY STATEMENT AND LIMITATIONS

The report is addressed to and may be relied upon by the following:
DeTrafford, Brooke Court, Lower Meadow Road, Wilmslow, Cheshire, SK9 3ND.

This assessment has been prepared for sole use of the above-named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP. No responsibility will be accepted where this report is used in its entirety or in part, by any other party. Information provided by others is taken in good faith as being accurate. WSP cannot and will not accept liability for any deficiencies in third party information. General Limitations are presented in Appendix G.

# 2 SITE DETAILS & SITE ENVIRONMENTAL SETTING

## 2.1 SITE DETAILS

Pertinent site details from a review of online mapping and a site walkover of the external areas (no entry into the existing building was undertaken) are summarised in Table 2-1 and notable site features are shown on Figure 2.

**Table 2-1 – Site Details**

| Item | Detail |
|---|---|
| Site Address | Ellesmere Street, Cornbrook, Manchester, M15 4JY. |
| Site Location | The site is located in a predominantly residential area near Manchester City Centre, at the junction between Ellesmere Street and Bentinck Street. |
| National Grid Coordinates | 382702, 397223 |
| Area, Elevation and Topography | The 0.30-hectare site is located at 33metres above ordnance datum (m AOD). The site is flat. |
| Current Use / Site Description | The site comprises<br>¡ A rectangular brick building in the north west;<br>¡ Former Cawdor Street parallel with the building in the centre of the site; and<br>¡ A construction yard in the centre and south east.<br><br><u>Building</u><br><br>The building comprises three storeys, with single storey flat roof extensions at the north eastern and south western ends. The client advised that the building is temporarily being used by DeTrafford as office space and that there are no basements or old heating oil tank rooms within the building. There are several roller shutters on the southern building face and multiple door entrances on the Ellesmere Street side of the building. Signage indicates it was previously used as an art gallery and was formerly known as 'Phoenix House'.<br><br><u>Construction Yard</u><br><br>To the south east of the building is a concrete pavement and beyond this, the remainder of the site is used as a construction yard associated with some of adjacent developments (see Surrounding Land Use below). The current construction yard layout comprises a vehicle access route which runs along the north eastern and south eastern site boundary. A second access road runs parallel to the building and is also a formerly a public road identified by online mapping as Cawdor Street.<br><br>The central part of the construction yard is used for materials storage and welfare, and the following was observed during the site walkover: a mortar tower, skips, storage and welfare /office containers, portable toilets and miscellaneous constructions materials including pallets of bricks and metal brackets. Localised areas of road markings suggest the area was historically used as car parking. Some historical palisade fencing was observed in the middle of the storage area.<br><br>No visual or olfactory evidence of surface contamination was observed during the walkover. |
| Ground Cover | Outwith the building, ground cover appears to be mostly hardstanding, comprising moderate to poor quality concrete. Cracked and damaged concrete in Cawdor Street revealed a cobbled surface beneath.<br><br>The central construction yard area is partially covered with what appears to be imported gravel, which is likely underlain by concrete hardstanding. |

| Item | Detail |
|---|---|
| Access and Site Boundaries | The construction yard is accessed through turnstiles / Heras fence gates at the north eastern site corner. The north eastern and south western site boundaries comprise hoarding and blue netted Heras fencing respectively. The south eastern boundary is open to an adjacent building currently under construction and the north western boundary is defined by the line of the site building. |
| Surrounding Land Use | The following land uses immediately surround the site:<br>¡ North and north west: Ellesmere Street, on the opposite side of the street is an historical industrial building, with modern signage suggesting it is soon to be converted to apartments.<br>¡ North east: Bentinck Street, with modern apartment buildings beyond (DeTrafford Development).<br>¡ South east: DeTrafford apartment buildings (under construction)<br>¡ South west: Industrial unit and mid -high rise apartments. |
| Asbestos in Buildings | It is considered likely that the site building contains asbestos or asbestos containing materials based on the estimated period it was constructed (i.e. early 1960s, see Section 3.1). An asbestos survey will be required, and any asbestos will need to be removed by a specialist contactor prior to building demolition.<br>This report does not consider risks from asbestos in the site building further. |

## 2.2 SITE ENVIRONMENTAL SETTING

### GEOLOGY

Reference to the BGS Geoindex indicates the site geology comprises Glaciofluvial Sheet Deposits of sand and gravel, underlain by bedrock of the Chester Sandstone Formation.

Based on the site history (See Section 3), Made Ground is anticipated to overlie natural strata. Infilled cellars are likely, as the site was historically occupied by terraced housing and also a public house in the south eastern corner.

To gain further insight into the likely ground conditions, a review has been completed of available third-party ground investigation logs for adjacent developments and also BGS logs Geo Index Logs.

¡ Site investigation undertaken by LK Consult at the adjacent Gallery Gardens Development (see Section 4) identified Made Ground at thicknesses of 0.90 – 5.05m bgl (although typically up to circa 3m bgl), with the deeper thicknesses of Made Ground interpreted as infilled former ‘basements’. A brick wall was also identified in one trial pit to a depth of 2.5m bgl, indicating that below ground structures on site are also likely. Encountered superficial deposits to a maximum depth of 4.20m bgl comprising either gravelly sandy and silty clay or locally, gravelly very silty sand (it is not stated if these are interpreted to be Glaciofluvial Deposits). This was underlain by weathered bedrock comprising clayey sand, with competent bedrock inferred from 5.80 – 6.00m bgl and described as weak red micaceous sandstone with occasional rounded quartz gravel inclusions.

¡ There are no BGS logs on site, however, there were three boreholes drilled in Hulme Hall Road to the south / north west, all within 100m of the site. The nearest, (50m south west reference SJ89NW124) recorded 0.91m of ‘Made Ground’ underlain by approximately 5m of superficial deposits comprising 1.83m of ‘sandy loam’, 0.91m of ‘sand and ballast’, 2.13m of ‘clay’. ‘Red sandstone’ was recorded from 5.79m bgl.

## HYDROGEOLOGY

The Groundsure Report (Appendix C) indicates the following aquifer designations:

- The superficial deposits are classed as a Secondary A Aquifer
- The Chester Sandstone Formation (Bedrock) is classed as a Principal Aquifer.

There are no groundwater abstractions within 1km of the site.

Groundwater depths are not recorded on the nearest BGS logs (within 100m of the site). Ground Investigation undertaken by LK Consult on the adjacent Gallery Gardens Development (see Section 4) recorded resting groundwater at depths of between 5.40m and 5.80m bgl.

## HYDROLOGY

The nearest surface water feature is a basin of the Bridgewater Canal 30m north west. The Manchester Ship Canal is 220m to the northwest.

There are two surface water abstraction licences registered to a location 243m northwest of the site on the River Irwell, for CDS Computer Design Systems. Both licences have a status of 'historical' and details provided state the water was for 'general cooling'.

## SENSITIVE LAND USES

There are no recorded sensitive land uses within 1km of the site in the Groundsure Report. Residential buildings are adjacent to the site.

## GROUND HAZARDS

### Ground Stability

Ground stability hazards identified in the Groundsure Report are summarised in Table 2-2 below.

**Table 2-2 – Ground Stability Hazard Summary**

| Stability Hazard | Risk Level |
|---|---|
| Potential for collapsible ground | Very Low |
| Potential for compressible ground | Negligible |
| Potential for dissolution | Negligible |
| Potential for landslides | Very Low |
| Potential for running sands | Low |
| Potential for swelling or shrinking clays | Negligible |

### Landfills and Waste Management

According to the Groundsure Report there are no historical landfills within 250m of the site. Multiple licences are associated with an historical waste site situated 250m west, listed as a Breakers Yard.

**Radon**

The site is within a lower probability radon area where less than 1% of properties are at or above action levels. Radon protection measures are not necessary in the construction of new properties within this area

**Coal Mining**

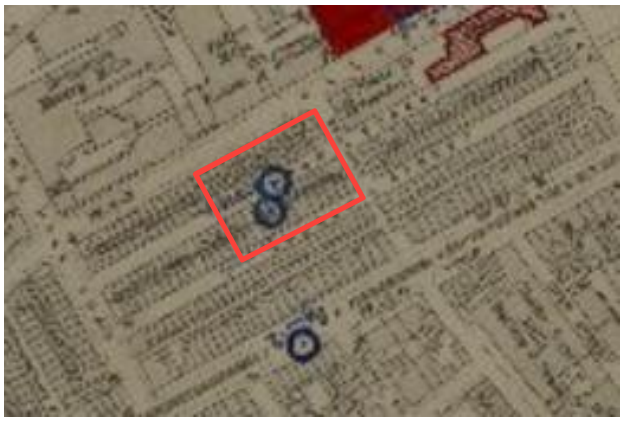
According to the Coal Authority Interactive Map, the site is in a coal mining reporting area, but not in a development high risk area or area affected by past shallow coal mining.

**Unexploded Ordnance**

A review of the Manchester Bomb Record image archive has been undertaken and is presented alongside an extract of the historical map dated 1948-1949 in Excerpt 2-1 below.

The blue circles are understood to indicate incidences of 'high explosives', of which, there are two within the site boundary. The areas shaded in pink and red off-site to the north east indicate damaged and demolished buildings. The historical map dated after World War II indicates some residential houses have been cleared in these locations; considered likely due to bomb damage.

**Excerpt 2-1 - Manchester Bomb Record Map (Source – The University of Manchester) and Historical Map 1948-1949 (Groundsure Report)**



According to the Zetica Bomb Risk Map, the site is situated in an area of moderate risk for unexploded bombs. A Zetica pre-desk study assessment states that several high explosive bombs fell 'near the site' and a detailed desk study is recommended to assess and potentially zone the unexploded ordnance (UXO) hazard level within the boundary. The UXO rating will have a significant impact on UXO mitigation for future ground investigation works and foundation construction.

The Zetica Bomb Risk and Pre-Desk Study Assessment are presented in Appendix E.

## 2.3 REGULATORY INFORMATION

The Groundsure Report has been reviewed for pertinent regulatory information and summarised below:

- There have been five recorded pollution events within 500m to controlled waters, the closest occurred 59m north west of the site and was a category 3 (minor) process effluent (sewage) loss.

- A total of five discharge consents within 500m of the site, the nearest active consent is listed 200m northwest for the discharge of sewerage into the Manchester Ship Canal.

## 2.4 CONTAMINATED LAND OFFICER (CLO) CONSULTATION

A request for information from the CLO at Manchester City Council was made on 14 October 2020. At the time of report issue (version 2), a response had not been received.

It is considered unlikely that any information that might be available from the contaminated land officer would have a significant impact on the conclusions from this assessment; however, it is recommended that this information be obtained, if possible, prior to any intrusive ground investigation.

# 3 SITE HISTORY

A review of historical maps from the Groundsure Maps has been completed to identify key developments and potential contaminative land uses on site and within 250m. The historical maps are included in Appendix C.

## 3.1 ON SITE

In summary, the site was initially developed as terraced residential housing, the majority of which was demolished by the mid to late 1940s (possible bomb damage). A building identified as a 'Works' was subsequently constructed in the north west in the same location and configuration as the present-day building. A public house was also constructed in the south eastern corner but was absent by circa 2000.

Full details are presented in Table 3-1 below.

**Table 3-1 – Summary of on-site historical development**

| Feature | Location | Mapping Dates | Details |
|---|---|---|---|
| Terraced Housing, associated with Ellesmere Street (adjacent to north east), Cawdor Street (bisects the site south west to north east) and Church Street (adjacent to the south west) | Majority of the site, with the exception of Cawdor Street. | Present from 1891 (1:2,500 Country Series Town Plan)<br>Until 1976 – 1981 (1:2,500 National Grid Mapping) | Significant proportion of buildings are absent by 1948-1951, possibly as a result of World War Two damage (this is unconfirmed but is consistent with the Manchester Bomb Record which indicates two high explosives fell within the site boundary, see Section 2.2 – Unexploded Ordnance).<br>Buildings remain on mapping in the north eastern area and north western corner until circa 1976.<br>High likelihood of cellars underneath the building, which were likely infilled following demolition. |
| Rectangular building labelled as 'Works' (specific use unknown) | North western area, covering approximately a third of the site | 1963 (1:2,500 National Grid Mapping)<br>Until Present | Same location as existing site building.<br>Extension at the south western end of building shown from 1988-1992 mapping, consistent with present day building configuration. |
| 'Star Inn' Public House | South eastern site corner | 1976-1981 (1:2,500 National Grid Mapping)<br>Until 2001 (1:10,000 National Grid Mapping) | High likelihood of cellar / basement, infilled post demolition. |
| Three rectangular buildings | South western site area | 1963 (1:2,500 National Grid Mapping)-<br>Until 1976 – 1981 (1:2,500 National Grid Mapping) | Use / purpose of buildings is unknown. |

## 3.2 OFF SITE

The surrounding site area history is characterised by widespread industrial development, with multiple Cotton Mills, Factories, Dye / Chemical Works within 100m of the site and beyond, with many of the heavy industrial sites recently developed or renovated into residential apartments / houses.

**Table 3-2 – Summary of significant off-site development (within 250m)**

| Feature | Distance from site (m) | Direction from site | Mapping Dates | Details |
|---|---|---|---|---|
| Brass Foundry (later a 'Factory') | 10 | West | 1932 (1:2,500 Country Series Town Plan)<br>Until 1976-1981 (1:250 National Grid Mapping | Demolished and replaced by a warehouse by 1982.<br>Recent site walkover identified recently constructed multi-storey residential apartment buildings. |
| Britannia Emery Mills | 15 | North west | 1851 (1:2,500 Country Series Town Plan)<br>Until present (buildings remain, mills not operational). | Development initially started with a Cotton Mill and Sawmill before subsequent expansion into the Brittania Emery Mills, by circa 1908.<br>Brittania Mills is identified as a 'Works' from 1982.<br>Current under renovation into residential apartments. |
| Talbot Mills (Cotton and Braid) | 15 | North | 1891 (1:2,500 Country Series Town Plan)<br>Until present (buildings remain, mills not operational). | Later identified as 'Mill' only by 1963-1964. |
| Ellesmere Brewery (later Trafford Dye Works, a Clothing Factory, then an Electrical Engineering Works) | 25 | North east | 1891 (1:2,500 Country Series Town Plan)<br>Until 2003 (1:2,500 National Grid Mapping) | Buildings at the eastern end are absent by circa 1948 -1949 (associated with bomb damage). A new 'Works' building is constructed by 1963. Buildings at the western end are absent by 1976-1981. Historical buildings are all absent by 2003.<br>Recent site walkover identified recently constructed multi-storey residential apartment buildings. |
| Albert Mills (Cotton) (Later Terres Factory – Clothing) | 80 | North west | 1891 (1:2,500 Country Series Town Plan)<br>Until present (buildings remain, Factory not operational). | Garage is noted in the northeast corner of the Factory from 1948-1949 to 1951.<br>Recent site walkover identified recently redeveloped into commercial / residential use. |
| Excelsior Printing Works (later a Warehouse) | 90 | North west | 1891 (1:2,500 Country Series Town Plan)<br>Until 2003 (1:2,500 National Grid Mapping) | Recent site walkover identified modern multi-storey residential development. |

| Feature | Distance from site (m) | Direction from site | Mapping Dates | Details |
|---|---|---|---|---|
| Worsley Mills (worsted and braid), Hulme Corn Mills and Egerton Works (cabinet) | 100 | North east | 1893 (1:2,500 Country Series Town Plan)<br>Until 1993-1995 (1:2,500 National Grid Mapping) | All later merge into Worsley Mills site by 1932 comprising a Flour Mill (building absent by 1976-1981), Cardboard Box (later a 'Works' / 'Factory' and Paper Store (later warehousing).<br>Recent site walkover identified recently constructed multi-storey residential apartment buildings. |
| St Georges Church | 120 | North east | 1848 (1:10,560 County Series)<br>Until present | Graveyards noted on 1893 mapping but labelled as 'disused'. |
| Sand Pit | 100 | North east | 1848 (1:10,560 County Series) only | Area is later developed into terraced housing. |
| Chemical Laboratory (later redeveloped and extended into Chester Road Mills – Wedding & Tapes) | 100 | South east | 1893 (1:2,500 Country Series Town Plan)<br>Until 1963-1964 (1:2,500 National Grid Mapping) | Oil Works present at the southern end from 1932.<br>Later re-developed into residential housing. |
| Clarence Mills (Textile) (subsequently a Factory) | 170 | South | 1922 (1:2,500 County Series)<br>Until 1963-1964 (1:2,500 National Grid Mapping) | Redeveloped into residential housing by 1976-1981. |
| Cast Metal Works (later Brownall Works Brass Foundry) | 120 | South | 1932 (1:2,500 County Series)<br>Until 1993 – 1995 (1:1250 National Grid Mapping) | Building no longer identified as a Works by 1982.<br>Recent site walkover identified residential housing. |

# 4 SITE INVESTIGATION REPORTS

## 4.1 INTRODUCTION

WSP is not aware of any site investigation reports pertaining directly to the site. A number of reports for sites in the immediate vicinity were made available to WSP by the client, and a further review was undertaken on the Manchester City Council planning portal for further relevant reports. All relevant reports are summarised in Section 1.4 (Table 1). A review of the available reports has been undertaken and pertinent information from select reports is summarised below.

## 4.2 PHASE 1 REPORTS

*Gallery Gardens Manchester Phase 1 Preliminary Risk Assessment. LK Consult Group (LK Group) issued 28 July 2017 Ref LKC 1166* (Gallery Gardens – adjacent to south west)).

- This report summarises previous site investigation undertaken 'by others' on land directly to the south west of the subject site (Gallery Gardens development) and includes the logs of one borehole and five window sample holes drilled by Hydrock (the entire report associated with these logs is not included).
- Ground conditions encountered were Made Ground up to depths of 5.0m bgl comprising gravels and clay with demolition rubble, underlain by superficial deposits of sandy silty gravelly clay or clayey silty sandy gravel up to depths of 4.5 – 5.0m bgl. Bedrock was described as highly weathered red sandstone.
- Resting groundwater post site investigation was 4.4m bgl in superficial deposits. Some perched water was observed in Made Ground.
- No significant contamination in soil or groundwater was reported. Ground gas concentrations and flow rates were reportedly 'low'.

## 4.3 PHASE 2 SITE INVESTIGATIONS AND REMEDIATION STRATEGIES

*Gallery Gardens Manchester Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy. LK Consult Group (LK Group) issued January 2019 Ref LKC 17 1166* (Gallery Gardens – adjacent to south west)

- LK provide full details of previous site investigation reports associated with this area (Gallery Gardens Development) that have been reviewed; however, copies are not made available. The reports are;
  - Hydrock, report reference R/151858/004/Issue 2, dated June 2016 (this is assumed to be the report from which the above referenced Hydrock logs were extracted).
  - CC Geotechnical, report reference CCG C-15-8337 dated March 2016.
  - Brimstone Site Investigation, Stage 2 Detailed UXO Risk Assessment report reference DRA-18-1021, dated 17 April 2018
- LK Group drilled 4 No. window sample holes to a maximum depth of 5.86m bgl, 2 No. rotary boreholes to 20m bgl and excavated 8 No. trial pits to 1.20m bgl.
- Ground conditions encountered have been previously summarised in Section 2.2 and comprised loose granular or soft cohesive Made Ground with concrete, glass, ash, brick, clinker, ceramic, pottery, timber and metals to depths of between 0.95m and 5.05m bgl. Deeper thicknesses are inferred to be infilled former 'basements' associated with historical terraced housing (the housing

is associated with Cawdor Street, Ellesmere Street and Church Street, all of which extend onto the Phoenix Works site).

- Underlying natural strata comprised either gravelly sandy and silty clay or locally, gravelly very silty sand to 4.20m bgl, over weathered sandstone, becoming competent by 5.80 – 6.0m bgl.
- A brick wall was observed in one trial pit to 2.5m bgl.
- No visual or olfactory evidence of contamination was observed.
- No groundwater strikes were recorded; window sample monitoring wells were dry. Monitoring of the deeper borehole installations had not been completed at the time of report issue, although reference is made to previous monitoring by a third party which detected resting groundwater between 5.40 and 5.80m bgl.
- Exceedances of selected soils human health screening criteria for metals and polyaromatic hydrocarbons (PAHs) were identified in Made Ground. Asbestos was detected in one soil sample out of eleven. Remedial works were recommended for soils remaining in situ in soft landscaped areas.
- A ground gas risk assessment classified the site as Characteristic Situation 1 (CS-1) and no gas protection measures were recommended. Carbon dioxide concentrations exceeded 5% on more than one occasion and in more than one monitoring point, however, upgrade to CS-2 was not considered necessary on the basis that the inferred ground gas source (Made Ground) was to be largely removed to construct new basements.
- Risks to controlled waters were considered low.
- Additional site investigation works were proposed for inaccessible areas, and ongoing groundwater monitoring.
- Outline remedial works comprise an environmental capping system in areas of softstanding.
- No further reports relating to ground condition associated with this area have been made available.

*Remediation Strategy Block E1 and E2 Chester Road Resource and Environmental Consultants (REC) issued June 2018 Ref 103785p4r0* (St Georges Gardens – adjacent to south east).

- The Remediation Strategy refers to a number of site investigations completed by REC associated with the St Georges Gardens Development. Works comprised a total of five boreholes with rotary follow on to depths of 11.50m bgl and five window sample boreholes (final depths not stated).
- Ground conditions encountered comprised Made Ground up to 4.80m bgl comprising sandy gravel or clayey sandy gravel, underlain by superficial deposits of silty sand or silty clay to depths ranging from 1.50m to 6.50m bgl. Weathered sandstone bedrock was encountered between 4.90 and 6.50m bgl.
- Only discontinuous ‘perched’ groundwater was noted (depths not stated) and no groundwater samples could be analysed.
- No visual or olfactory evidence of contamination was observed.
- Concentrations of lead in Made Ground were considered to present a potential risk to human health if retained in areas of soft standing.
- The ground gas risk assessment concluded the site was classified as CS-2 on the basis of consistent carbon dioxide concentrations above 5% v/v.
- The Remediation Strategy recommended a clean cover system for soft standing areas, and the inclusion of ground gas protection measures for the building. Validation sampling and a verification plan for ground gas protection measures is also provided. No further reports relating to ground condition associated with this area have been made available

# 5 PRELIMINARY CONCEPTUAL SITE MODEL

## 5.1 INTRODUCTION

The potential risks from contamination within soil and groundwater are assessed according to the environmental setting/ground model, likely presence of potential sources of contamination and the proposed use of the site.

The source-pathway-receptor model forms the basis of the risk assessment; potential risks are only considered to exist if there is a credible source (e.g. chemical substance capable of causing harm); a pathway for migration of the source to the receptor; and a sensitive receptor that could be affected (e.g. nearby river or site users). A source-pathway-receptor contaminant linkage assessment is termed a conceptual site model (CSM). A preliminary CSM is produced prior to intrusive ground investigation and is refined following collection of site-specific data (if appropriate).

## 5.2 PRELIMINARY GROUND MODEL

The ground conditions at the site are anticipated to comprise Made Ground across the majority of the site, and locally be up to circa 5m in thickness (associated with infilled former cellars) and will likely comprise demolition waste, potentially including asbestos. Perched groundwater may be present in Made Ground.

Underlying the surface material, Glaciofluvial sheet deposits (Secondary A aquifer, although observations made during site investigations in the site vicinity have not recorded evidence of a significant water body in superficial strata), likely to comprise predominantly gravelly sandy and silty clay or locally, gravelly very silty sand up to 5m bgl. Superficial deposits may be absent in areas of thick Made Ground. Bedrock is anticipated to comprise sandstone, with upper strata highly weathered.

Both the Made Ground and superficial deposits are likely to be granular in places, offering little protection to the underlying bedrock Principal Aquifer.

## 5.3 SOURCES, PATHWAYS AND RECEPTORS

The potential sources of contamination, receptors relevant to the proposed residential redevelopment and potential exposure pathways have been identified and are presented below.

### POTENTIAL CONTAMINATION SOURCES

The potential sources of contamination are considered to be the following:

- Contaminants within Made Ground potentially including asbestos, metals, petroleum hydrocarbons and polyaromatic hydrocarbons particularly associated with ashy deposits (e.g. as a result of fire damage from bombing).
- Localised chemicals spillage – from the plant and materials storage associated with the site's current use as a Construction Yard.
- Hazardous ground gases associated with potentially thick Made Ground.
- Contaminants related to off-site heavy industrial use, which potentially have migrated to the site.

### POTENTIAL RECEPTORS

Relevant potential receptors are considered to include the following:

- Construction workers during redevelopment.
- Neighbouring site users during and after redevelopment.
- Future site users (i.e. residential occupants, maintenance workers).
- Underlying groundwater and the wider groundwater environment.
- Future building services (such as potable water pipes).

### POTENTIAL EXPOSURE PATHWAYS

Relevant potential pathways are considered to include the following:

- Direct contact, ingestion and inhalation of soil-bound contamination/ dust.
- Migration of leachable/ mobile contamination through soil, groundwater and surface water.
- Migration of potential ground gas into onsite or neighbouring buildings causing asphyxiation / risk of explosion.
- Direct contact between contaminants and buried services or infrastructure.

## 5.4 CONTAMINANT LINKAGE ASSESSMENT

On the basis of the information reviewed, the potential contaminant linkages that could be present are provided in Table 5-1.

The CIRIA C552 (Contaminated Land Risk Assessment: A guide to Good Practice, 2001) probability and consequence definitions (Appendix F**)**) were used to determine the level of risk should no risk mitigation measures be used in the new development.

In summary, the following contaminant linkages are considered to be potentially viable and require confirmation via intrusive ground investigation:

### DURING REDEVELOPMENT

- Human health risks to ground workers and third parties (neighbours) associated with inhalation of asbestos fibres that could be released during Made Ground excavation.
- Human health risks to ground workers and third parties (neighbours) due to direct contact / ingestion / inhalation of possible industrial soil and groundwater contaminants / hazardous ground gases.
- Mobilisation of contamination during the construction process, enabling it to migrate away from the site to impact groundwater / surface waters.

The above linkages should be broken by employing good working practices and materials management procedures during redevelopment.

### AFTER REDEVELOPMENT

- Potential risks to future site users and maintenance workers from contact with / inhalation of chemicals / asbestos / vapours within contaminated soils if present at shallow depth in areas of soft surface cover.
- Potential risks to future site users and maintenance workers from inhalation of accumulated hazardous ground gases in confined spaces.
- Potential risks to future residents if new potable water pipes are laid in contaminated soils.

These potentially complete contaminant linkages could be broken by completing some relatively basic remediation / mitigation works if sources are proven to be present, e.g. removal of hot spots of contamination, appropriate re-use of materials, provision of barrier pipe for potable water supplies in affected areas, provision of gas mitigation measures in properties.

**PRE- AND POST- DEVELOPMENT**

- Migration of mobile contamination to wider groundwater body and surface waters.

## 5.5 CONTAMINATION RISK RANKING

A qualitative risk ranking has been applied to the potentially complete contaminant linkages presented in Appendix F (based on the UK CIRIA report C552 Contaminated Land Risk Assessment: A Guide to Good practice, 2001), which considers a combination of the potential severity of the harm and the likelihood of the harm occurring. A summary table showing a definition of the risk rankings is provided below. The overall soil/groundwater contamination risk ranking for the site is considered to be **MODERATE TO LOW**.

| Classification | Definition |
|---|---|
| Very High Risk | Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken. |
| High Risk | Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term. |
| Moderate Risk | Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term. |
| Moderate / Low Risk | Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild.<br>Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent. |
| Low Risk | Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild. |
| Very Low Risk | Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild. |

## 5.6 EXCESS SOIL DISPOSAL

If it is proposed to remove excess excavated soils to landfill it will be necessary to sample, test and characterise the material via a hazardous waste assessment to determine if the soil would be classified as hazardous or non-hazardous waste on the basis of chemical/asbestos content.

If excavated soils or demolition materials have an appropriate and defined use within the new development they can be re-used and it is recommended this is completed under a CL:AIRE Definition of Waste Code of Practice Materials Management Plan, supported by testing and risk assessment.

**Table 5-1 – Contaminant Linkage Assessment – Assumes No Mitigation**

| Source | Pathway | Receptor | Probability of Complete Linkage | Consequence if Linkage Present | Risk Level | Comments |
|---|---|---|---|---|---|---|
| Chemical contamination within Made Ground or from previous historical uses on site / off-site | Direct contact, ingestion, dust inhalation | Site end users and maintenance workers (post development) | Likely | Medium | Moderate | Based on site history and investigations in the area, potentially significant thicknesses of Made Ground are anticipated, which may contain chemicals of concern. Softstanding areas are proposed as part of the development, thereby creating viable exposure pathways in these areas, should contaminants be present within the Made Ground. |
| | | Adjacent site users (pre and post development) | Likely | Medium | Moderate | A lot of residential properties in the vicinity, therefore likely that adjacent site users will access the site and areas of soft standing post development, and also be in close proximity during development, thereby completing theoretical linkages. |
| | | Construction Workers (pre-development) | Low | Medium | Moderate / Low | Assumed low likelihood on the basis that industry best practice will be used on site during constriction to minimise exposure to soil bound contamination and exposure duration is likely to be low. |
| | Leaching and migration | Secondary A and Principal Aquifers (pre- and post-development) | Likely | Medium | High | Whilst there is unlikely to be a continuous water body in superficial strata, theoretical pathways exists to the Principal Aquifer. |
| | | Surface Waters (Canals to the north / northwest) (pre- and post-development) | Low | Mild | Low Risk | Canals are likely to be lined, therefore migration of mobile contaminants is unlikely to enter the water course. |

| Source | Pathway | Receptor | Probability of Complete Linkage | Consequence if Linkage Present | Risk Level | Comments |
|---|---|---|---|---|---|---|
| | | Water Supply pipes (post development) | High | Medium | High | Water pipe alignment is currently unknown. Anticipated significant thicknesses of site wide Made Ground suggests pipes could be laid in these materials. |
| Asbestos | Inhalation of released fibres | Site end users and maintenance workers and adjacent site users (post development) | Likely | Medium | Moderate | Asbestos possible in demolition material if used to infill historical basements / cellars. Release of fibres during construction earthworks and from areas of softstanding left in-situ. |
| | | Adjacent site users and construction workers – (predevelopment) | Likely | Medium | Moderate | |
| Ground Gas (sourced from Made Ground) | Inhalation, asphyxiation, property explosion | Site end users and maintenance workers (post development) | Likely to Low | Medium | Moderate to Moderate-Low | Potentially significant thicknesses of Made Ground which could generate ground gas. |

# 6 PRELIMINARY GEOTECHNICAL ASSESSMENT

Given the form of the structure, the likely structural loads and the underlying ground conditions/likely depth to rock, it is not considered feasible to support the structure on pad or raft foundations. As a result, the use of piled foundations is considered appropriate, with the use of rock socketed, continuous flight auger (CFA) or rotary bored piles considered to be the most suitable piling techniques.

Suspended ground floor construction should be assumed at this stage although, it is possible that with appropriate re-engineering of the ground, a ground bearing solution may be feasible.

The risk of obstructions associated with previous site usages is considered to be high. Obstructions may significantly hinder the installation of bearing piles and groundworks in general. A detailed strategy will be required for managing obstructions within the Made Ground to minimise potential delays on site and associated abnormal costs.

The stability of the Made Ground or natural granular soils should not be relied upon in unsupported excavations. Safe working conditions should be ensured at all times where persons are required to work in any excavations. This can be achieved by the use of ground support or battering back to a safe angle. Appropriate consideration will need to be given to the stability of adjacent boundaries, structures and infrastructure when designing temporary works.

The risk of encountering groundwater in shallow excavations for pile caps and ground beams is considered to be low. However, there is a risk of encountering bodies of perched water within the Made Ground, which may require local control (e.g. by sump pumping). Groundwater monitoring will be required as part of any future ground investigation.

Significantly aggressive ground conditions (e.g. in excess of Design Sulphate Class DS3) are not anticipated. Appropriate testing of soils and groundwater will be required to determine the concrete grade.

# 7 CONCLUSIONS AND RECOMMENDATIONS

## 7.1 CONCLUSIONS

### ENVIRONMENTAL

There is a high likelihood of infilled cellars associated with a historical public house in the south east corner and terraced housing which occupied most of the site area, supported by the third-party site investigation in the adjacent Gallery Gardens Development, which locally identified Made Ground up to 5.05m bgl (but typically up to 3m bgl). Therefore, the potential for significant thicknesses of Made Ground on site, and sub-surface structures such as walls and floors, is considered likely.

Depending on the thickness, Made Ground will likely be underlain by superficial deposits of gravelly sandy and silty clay or locally, gravelly very silty sand (Secondary A Aquifer) over the Chester Sandstone Formation (Principal Aquifer). Resting groundwater is likely to be between 5 and 6m bgl, with some perched groundwater in Made Ground possible.

The potential for significant or gross contamination across the majority of the site is considered to be moderate to low, however, Made Ground has the potential to contain contaminants of concern and could generate hazardous gases. Site investigations in adjacent developments (e.g. Gallery Gardens, St Georges Gardens) identified concentrations of heavy metals and PAHs which could present a risk to human health in areas of soft standing if Made Ground were to remain in-situ and therefore, given the proximity and similar development histories, similar risks are possible on the subject site.

The identified potentially complete contaminant linkages are associated with the potential for chemical and asbestos contamination associated with previous uses of the site and surrounding area and Made Ground materials that are likely to be present. If potential risks are confirmed to be present via intrusive investigation, it is likely that they could be mitigated by relatively simple methods within the development (e.g. removal of hot spots, clean cover soil in landscaped areas, ground gas protection measures).

The presence of chemical or asbestos contamination within excess excavated soils will have implications for material reuse or off-site disposal to landfill and, along with groundwater quality, should be considered and assessed during any intrusive investigation.

Records suggest two high explosives fell within the site boundary during the Second World War. This is further confirmed by the almost complete absence of historical terraced housing in post-war mapping, which was likely damaged and demolished following bombing. Zetica classify the site as moderate risk for unexploded ordnance and a detailed desk study is recommended to fully assess potential UXO risks.

On the basis of the reviewed information and the preliminary risk assessment, the likelihood of the site being classified as statutory contaminated land (i.e. presenting a significant risk of significant harm) is considered to be low. The likelihood of potential third-party liabilities associated with soil and groundwater contamination presenting a future risk to off-site receptors is also considered low. Intrusive site investigation and risk assessment is required to provide further information on liabilities associated with soil and groundwater contamination.

**GEOTECHNICAL**

- The use of piled foundations and suspended ground floor construction should be assumed. CFA or rotary bored piles, terminating in the Chester Sandstone Formation may prove suitable.
- The risk of obstructions associated with previous site usages is considered to be high and a detailed mitigation strategy will be required to minimise potential delays on site and associated abnormal costs.
- The stability of the Made Ground or natural granular soils should not be relied upon in unsupported excavations and appropriately designed temporary works will be required to support excavations within the site and structures and infrastructure outwith the site boundaries.
- Groundwater is considered unlikely to pose a significant risk to shallow excavations for pile caps and ground beams although, there is a risk of encountering perched groundwater bodies within the Made Ground, which may require appropriate dewatering.

## 7.2 RECOMMENDATIONS

Based on the data presented within this report it is recommended that an intrusive investigation is completed to:

- Confirm the presence/absence of contaminant linkages, confirm liabilities and identify abnormal development constraints associated with contamination and ground conditions (including soil gases).
- Provide sufficient geotechnical information to allow cost-effective design of substructures. The groundwater level will need to be confirmed as part of any future ground investigation.
- Enable preparation of an intrusive investigation report and remediation strategy (if required), both likely to be a condition of the planning permission.
- Provide data to enable a waste classification assessment of any soils destined to be taken off site, to determine likely disposal routes and costs.
- Provide information for a water company potable water pipeline risk assessment for the proposed building.

A detailed UXO desk study is also required in advance of any ground investigation or earthworks to assess risks from this hazard.

It is recommended that information on potential contamination is obtained from the contaminated land officer for review in advance of any intrusive works.

File: Created using iGIS, WSP's Online Mapping System

Drawn By: laura.furlong

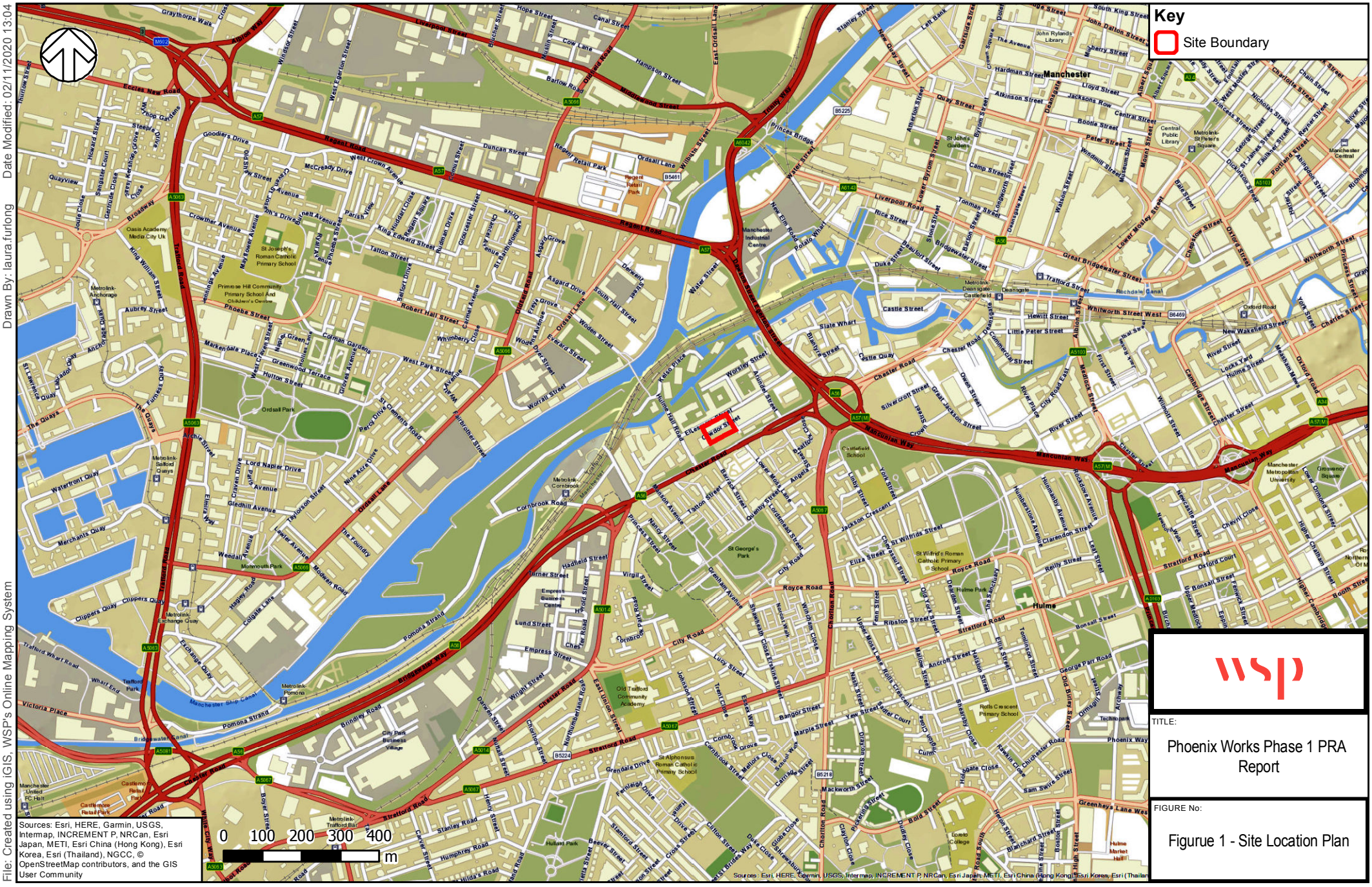
Date Modified: 02/11/2020 13:13

TITLE:

Phoenix Works Phase 1 PRA Report

FIGURE No:

Figure 2 - Site Layout Plan




File: Created using iGIS, WSP's Online Mapping System

Drawn By: laura.furlong

Date Modified: 02/11/2020 13:04

# Appendix A

## DEVELOPMENT PLANS

The copyright of this drawing is vested with Corstorphine + Wright Ltd and must not be copied or reproduced without the consent of the company.

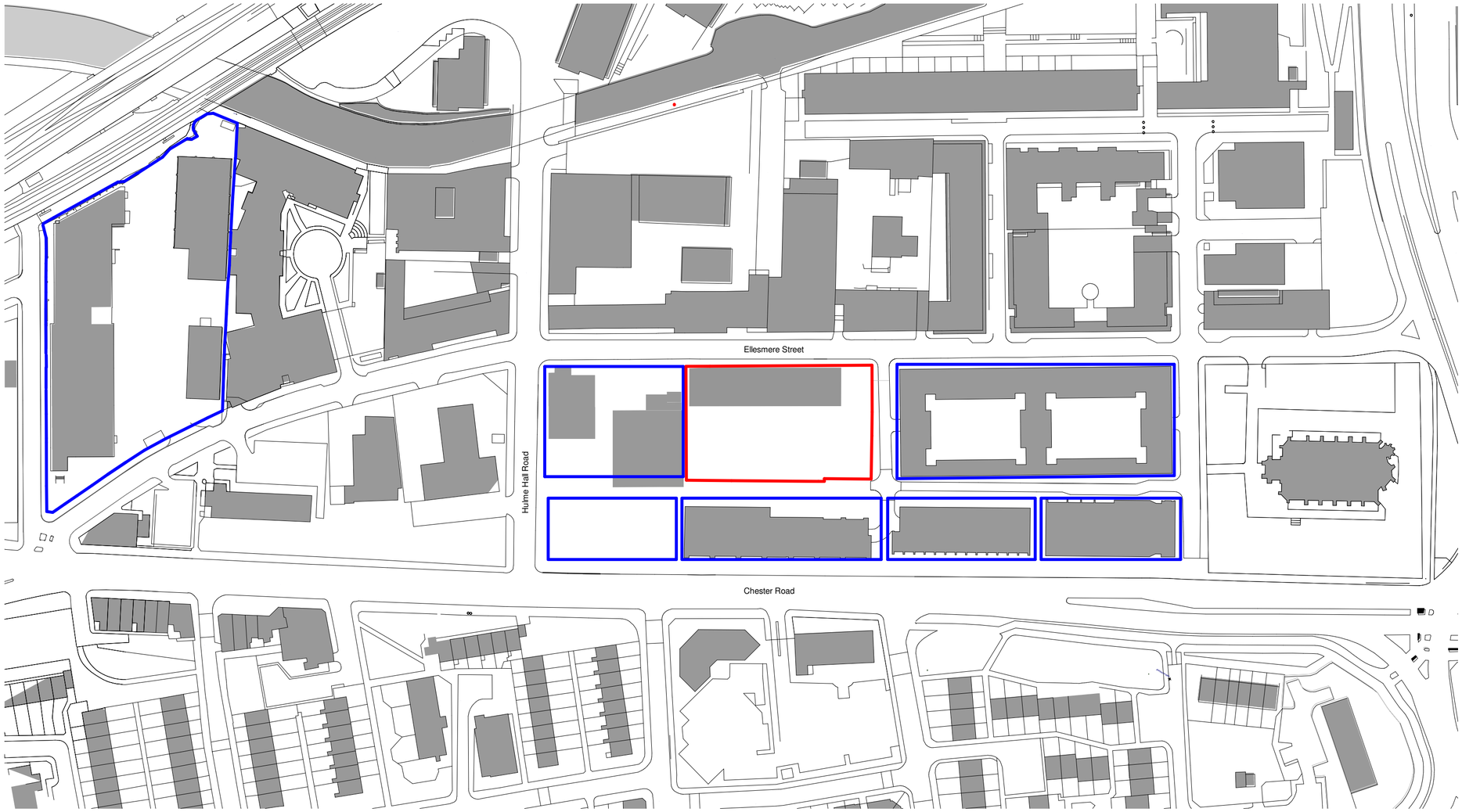
Figured dimensions only to be taken from this drawing. DO NOT SCALE. All contractors must visit the site and be responsible for checking all setting out dimensions and notifying the architect of any discrepancies prior to any manufacture or construction work.

NOTES:

25m 125m

Same Ownership / Control

Proposed Site Boundary




| Rev | Description | Date | Dr by | App by |
|---|---|---|---|---|
| P02 | Issued for Planning | 20.11.20 | MD | MB |
| P01 | First Issue | 06.11.20 | DM | MD |

Project Stage

# PLANNING

Client:

DE TRAFFORD

Project:

PHOENIX WORKS

Drawing Title:

Site Location Plan

| Drawn | Checked | Paper Size | Scale | Date |
|---|---|---|---|---|
| DM | MD | A2 | 1 : 1250@A2 | 11/05/20 |

Drawing No.: 20098-CW-B1-XX-DR-A-7000

Revision: P02

Drawing BIM Name: 20098-CW-B1-ZZ-M3-A-BUIL-S1.RVT

| CDE Area: | Suitability Code: | BIM Revision: |
|---|---|---|
| | | P01.01 |

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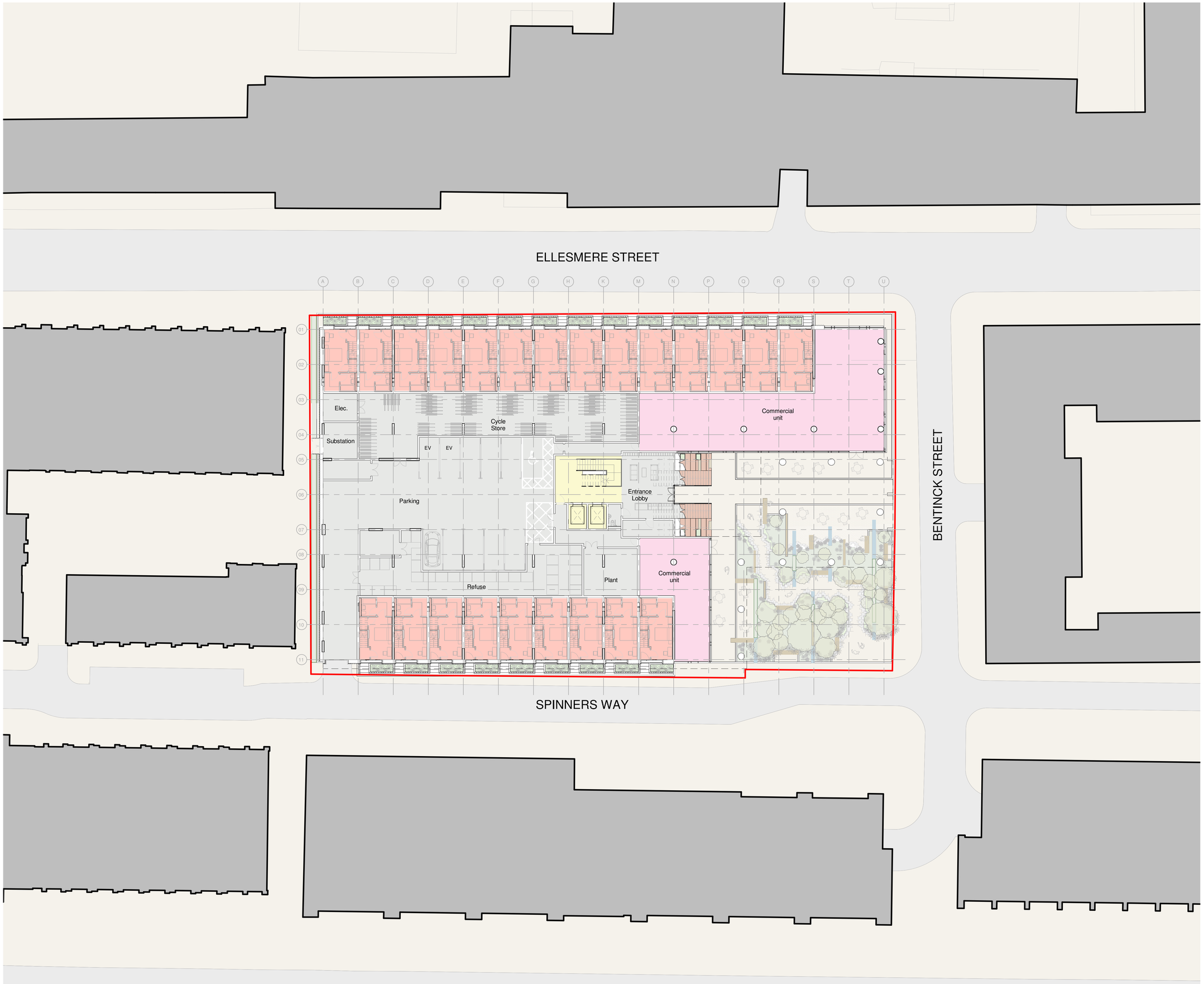


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**Figured dimensions only to be taken from this drawing. DO NOT SCALE. All contractors must visit the site and be responsible for checking all setting out dimensions and notifying the architect of any discrepancies prior to any manufacture or construction work.**

**NOTES:**

**This drawing is issued for information only. All areas and apartment layouts are provisional and subject to change.**

5m 20m

NIA

- Commercial Unit
- Core
- Lobby
- Refuse
- Townhouse

| Rev | Description | Date | Dr by | App by |
|---|---|---|---|---|
| P01 | Issued for Planning | 20.11.20 | DM | MB |
| 00 | Issued for information | 23.08.20 | DM | MD |

**Project Stage**

# PLANNING

Client:
DE TRAFFORD

Project:
PHOENIX WORKS

Drawing Title:
Ground Floor GA

| Drawn | Checked | Paper Size | Scale | Date |
|---|---|---|---|---|
| DM | MD | A1 | 1 : 200@A1 | 08/23/20 |

Drawing No.
20098-CW-B1-ZZ-DR-A-2000

Revision
P01

**Drawing BIM Name:**
20098-CW-B1-ZZ-M3-A-BUIL-S1.RVT

| CDE Area: | Suitability Code: | BIM Revision: |
|---|---|---|
| | | P01.01 |

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# Appendix B

## PHOTOGRAPHS

# PHOTOGRAPHS

Photograph 1

Site building ‘Phoenix House’ view south from Ellesmere Street.

Photograph 2

Single storey extension to building at southwestern end. View south east from Ellesmere Street

# PHOTOGRAPHS

Photograph 3

Single storey extension to building at north eastern end. View south east from Ellesmere Street

Photograph 4

View west along Cawdor Street, with Phoenix Works building adjacent.

# PHOTOGRAPHS

Photograph 5

View south east across the Construction Yard area (Sky Gardens Development can be seen in the background)

Photograph 6

View north west across Construction Yard area

# PHOTOGRAPHS

Photograph 5

View north east long south eastern site boundary. Sky Gardens Development is to the right of the image and Roof Gardens is visible in the background.

Photograph 6

Entrance to Construction Yard area to the north eastern site corner. View south.

# Appendix C

## GROUNDSURE REPORT

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# Appendix D

## BGS LOGS

(B11857) Wt. 17852—S154—5,000 12/26 Gp. 160. O.A.

SJ 89 NW 121-12

G.S.M. Nos. 122-

**SECTION OF** Bores & Shafts **at** Irwell Storm Relief Overflow S Cornbrook, Manchester.

Maps: One-inch 85. Six-inch 104 S.W.E County Lancs.

Height above O.D. Latitude Longitude

Communicated by Date of Sinking

Made by Manchester Corporation Dip of Strata

| | Thickness. | | | Depth from |
|---|---|---|---|---|
| No. 122 N 121 91.34 ft. O.D. In Hulme Hall Road. Immediately S. of Railway. CORNBROOK. | | | | |
| Filling | 1.83 | 6 | - | 1.83 |
| 104 S.W.E Loamy sand. | 1.83 | 6 | - | 3.66 |
| Soft red sandstone. | 3.35 | 11 | - | 7.01 |
| Red rock. | 4.37 | 14 | 4 | 11.38 |
| No. 123. N 122 96.96 ft. O.D. In Hulme Hall Road. Immediately S. of Bridge Water Canal. CORNBRO | | | | |
| Filling | 1.22 | 4 | - | 1.22 |
| 104 S.W.E. Gravel & sand | 4.57 | 15 | - | 5.79 |
| Red rock (Water level at 28 ft.) | 7.32 | 24 | - | 13.11 |
| No. 124 Manhole 2. In Hulme Hall Road. 27 yds east of Canal Bridge. | | | | |
| 123 ft. O.D Made ground | 1.07 | 3 | 6 | 1.07 |
| Loose sandy gravel | 3.96 | 13 | - | 5.03 |
| Red sandstone. | 3.35 | 11 | - | 8.38 |
| No. 125 Manhole 3. 4 yds. N.W of corner of Hulme Hall Rd. & Chester Rd. | | | | |
| 124 ft. O.D. Made ground | 0.91 | 3 | - | 0.91 |
| Sandy loam | 1.83 | 6 | - | 2.74 |
| Dirty sand & ballast | 0.91 | 3 | - | 3.66 |
| Clay | 2.13 | 7 | - | 5.79 |
| Red sandstone. | 2.59 | 8 | 6 | 8.38 |
| No. 126 125 Manhole 4 10 yds. S.E. of corner of Hulme Hall Rd & Chester Rd. | | | | |

# Appendix E

## ZETICA PRE-DESK STUDY ASSESSMENT AND UXB RISK MAP

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zeticauxo

# Pre-Desk Study Assessment

| | |
|---|---|
| **Site:** | Phoenix Works, Ellesmere Street, Manchester |
| **Client:** | WSP |
| **Contact:** | Laura Furlong |
| **Date:** | 21st October 2020 |
| | |
| Pre-WWI Military Activity on or Affecting the Site | None identified. |
| WWI Military Activity on or Affecting the Site | None identified. |
| WWI Strategic Targets (within 5km of Site) | The following strategic targets were located in the vicinity of the Site:<br>■ Manchester Ship Canal and Salford Docks.<br>■ Transport infrastructure and public utilities.<br>■ Industries important to the war effort, including munitions factories, aircraft manufacturing, and engineering works.<br>■ Royal Flying Corps (RFC) Alexandra Park.<br>■ Military barracks and training areas.<br>■ Anti-Aircraft (AA) guns. |
| WWI Bombing | None identified on the Site. |
| Interwar Military Activity on or Affecting the Site | None identified. |
| WWII Military Activity on or Affecting the Site | None identified. |
| WWII Strategic Targets (within 5km of Site) | The following strategic targets were located in the vicinity of the Site:<br>■ Manchester Ship Canal and Salford Docks.<br>■ Transport infrastructure and public utilities<br>■ Industries important to the war effort, including munitions factories, aircraft manufacturing, engineering and metal works.<br>■ Military barracks, camps, and training areas.<br>■ AA defences. |
| WWII Bombing Decoys (within 5km of Site) | None. |
| WWII Bombing | During WWII the Site was located in the County Borough (CB) of Manchester, which officially recorded 737No. High Explosive (HE) bombs with a bombing density of 27.1 bombs per 405 hectares (ha).<br><br>The Manchester area was heavily bombed between the 22nd and 24th December 1940 (the 'Manchester Blitz'). Over 400No. HE bombs and more than 30,000 Incendiary Bombs (IBs) fell across the region.<br><br>Readily available records indicate that several HE bombs fell in close proximity to the Site. |
| Post-WWII Military Activity on or Affecting the Site | None identified on the Site. |
| Recommendation | It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site. |

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary.

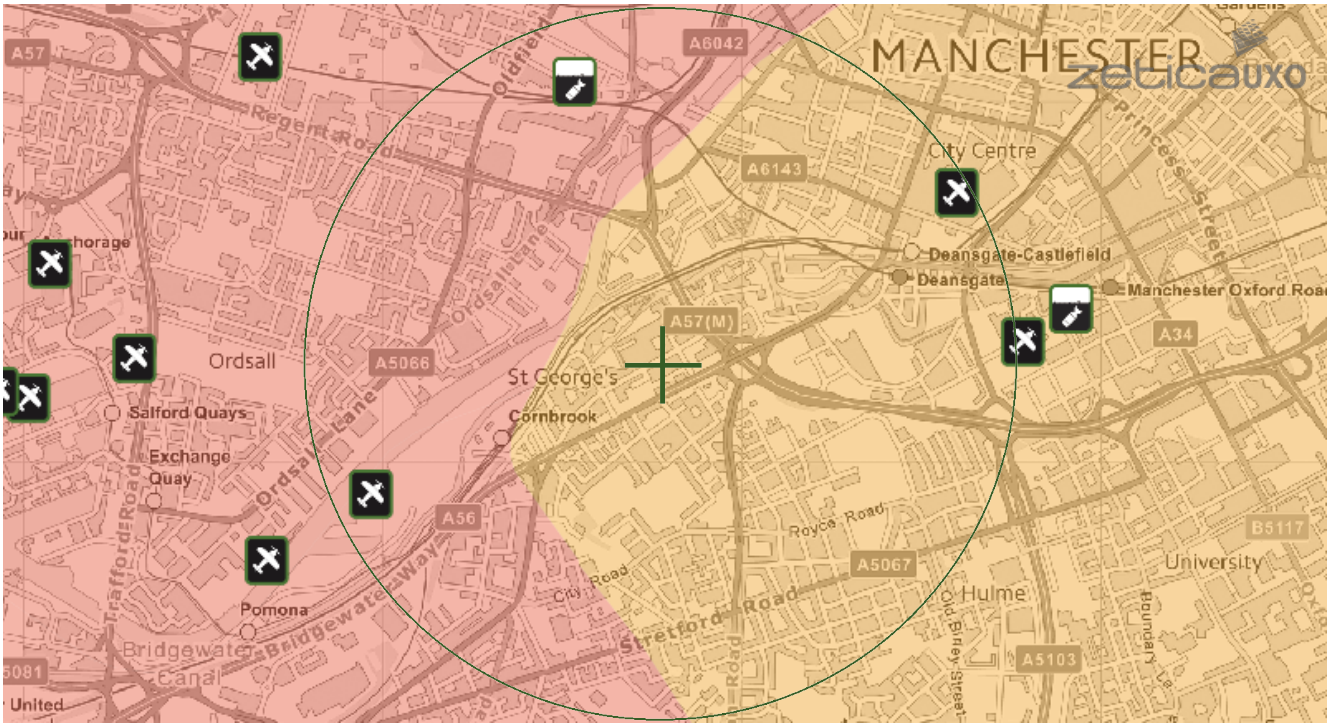
It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.

# UNEXPLODED BOMB RISK MAP

zeticauxo

## SITE LOCATION

Map Centre: 382785,397273




## LEGEND

- **High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- **Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- **Low:** Areas indicated as having 15 bombs per 1000acre or less.

| | | |
|---|---|---|
| **miltary** | **industry** | **UXO find** |
| **transport** | **dock** | **Luftwaffe targets** |
| **utilities** | **Bombing decoy** | **other** |

### How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

### What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

**Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.**

### If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

### If I have any questions, who do I contact?


tel: **+44 (0) 1993 886682**

email: **uxo@zetica.com**

web: **www.zeticauxo.com**


The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: **(https://zeticauxo.com/downloads-and-resources/risk-maps/)**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It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

# Appendix F

## CIRIA C552 RISK ASSESSMENT TABLES

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# CIRIA RISK APPRAISAL METHODOLOGY

Assessing potential risks from potentially complete "contaminant linkages" is key to the evaluation of contaminated land. An approach based on the UK CIRIA report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001) has been adopted within this report to estimate the level of risk associated with each potentially viable contaminant linkage. Risk from contamination is determined by a combination of:

- The magnitude of harm that will be caused if the contaminant linkage is present; and
- The likelihood that the contaminant linkage is present.

Table 1 summarises the CIRIA definition of four levels of severity / magnitude of harm. The probability of the harm occurring is classified by criteria given in Table 2.

TABLE 1 CLASSIFICATION FOR SEVERITY

| Classification | Definition |
|---|---|
| Severe | Acute effects on human health;<br>Major pollution of controlled waters (watercourses or groundwater) |
| Medium | Chronic (long-term) effects on human health;<br>Pollution of sensitive controlled waters (surface waters or aquifers) |
| Mild | Pollution of non-sensitive water resources. |
| Minor | Requirement for protective equipment during site works to mitigate health effects;<br>Damage to non-sensitive ecosystems or species |

TABLE 2 PROBABILITY OF RISK OCCURRING

| Classification | Definition |
|---|---|
| High Likelihood | Contaminant linkage may be present, and harm is almost certain to occur in the long term, or there is evidence of harm to the receptor. |
| Likely | Contaminant linkage may be present, and it is probable that harm will occur over the long term. |
| Low Likelihood | Contaminant linkage may be present and there is a possibility of harm occurring, although there is no certainty that it will do so. |
| Unlikely | Contaminant linkage may be present but the circumstances under which harm would occur are improbable. |

The risk levels are determined by combining severity and probability, as presented in Table 3.

TABLE 3 RISK CATEGORY FROM COMBINATION OF SEVERITY AND PROBABILITY

| RISK CATEGORIES | | Severity of Harm | | | |
|---|---|---|---|---|---|
| | | Severe | Medium | Mild | Minor |
| Probability of Harm | High Likelihood | Very high risk | High risk | Moderate risk | Moderate / low risk |
| | Likely | High risk | Moderate risk | Moderate/ low risk | Low risk |
| | Low Likelihood | Moderate risk | Moderate/ low risk | Low risk | Very low risk |
| | Unlikely | Moderate / low risk | Low risk | Very low risk | Very low risk |

Table 4 then provides a description of the typical consequences and potential actions required following each risk definition.

TABLE 4 QUALITATIVE RISK ASSESSMENT - CLASSIFICATION OF CONSEQUENCE

| Classification | Definition |
|---|---|
| Very High Risk | Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken. |
| High Risk | Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term. |
| Moderate Risk | Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term. |
| Moderate / Low Risk | Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as Moderate. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent. |
| Low Risk | Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild. |
| Very Low Risk | Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild. |

# Appendix G

## REPORT LIMITATIONS

# REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

## GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

## PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

**Coverage:** *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

## INTRUSIVE INVESTIGATION REPORTS

**Coverage:** *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

    i. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or

    ii. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

## EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

## DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

## GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

## MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

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