

Foundation Works Risk Assessment

Moxy Hotels, KE Hotels, Manchester

May 2018

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This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

Comments

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1. Introduction

1.1 Objectives

Waterman Infrastructure & Environment Limited ("Waterman") was instructed by Waterman Structures Ltd to undertake a Foundation Works Risk Assessment for the proposed redevelopment of Moxy Hotels, KE Hotels, Manchester (hereafter termed "the Site").

The objective of the assessment is to assess the potential environmental risks that may arise as a result of the foundation solution chosen for use at the Site, taking into consideration the Conceptual Site Model (CSM) and the mitigation measures that will be adopted during the installation of foundations.

1.2 Regulatory Context

The proposed development was granted planning permission (Ref. 116164/FO/2017) with a number of conditions attached. Planning Condition 11 relates to the assessment of potential risks to groundwater associated with the foundation solution, and states:

'Piling or any other foundation designs using penetrative methods shall not be permitted other than with the express written consent of the local planning authority, which may be given for those parts of the site where it has been demonstrated that there is no resultant unacceptable risk to groundwater. The development shall be carried out in accordance with the approved detail'.

Reason: - 'In the interests of amenity and public health, pursuant to policy DM1 of the Core Strategy for the City of Manchester."

This report has been prepared in pursuit of the discharge of planning condition 11.

1.3 Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Waterman Structures Limited, as documented in Waterman's fee email dated 18th April 2018, and with Waterman's standard Terms of Appointment.

The benefit of this report is made to Waterman Structures Limited.

The information contained in this report is based on a review of available historical, geological and hydrogeological sources, consultation with the regulatory authorities and observations made on site.

Waterman has endeavoured to assess all information provided to them during this investigation, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this investigation does not include an assessment for the presence of asbestos containing materials within or below buildings or in the ground at the Site.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.

2. Methodology

This Foundation Works Risk Assessment has been undertaken in general accordance with the guidelines outlined within “Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention” (NGWCLC Report NC/99/73 – Environment Agency, May 2001).

The report includes the following:

- Site setting;
- Site geology;
- Site hydrology and hydrogeology;
- Summary of proposed development;
- Proposed foundation solution;
- Risk assessment;
- Predicted impacts of the proposed foundation works;
- Quality control and quality assurance measures; and,
- Selected methodology, mitigation measures and monitoring requirements.

3. Site Setting

3.1 Site Location

The Site is located at National Grid Reference 383525, 398072 on Atkinson Street, in the central area of the City of Manchester. The Site is roughly rectangular in shape and occupies an approximate area of 0.08 hectares. Figure 1 presents the current Site layout, a Site Location Plan is included in Appendix A.

Figure 1: Current Site Layout



Source: Google Maps, Accessed Online: 02/05/2018

3.2 Site Description

The Site is occupied by Invicta House, an 'L' shaped building present at the east and southern boundaries, which occupies approximately half of the Site area. The building comprises of four stories and is of brick construction. A basement is also present beneath the southern half of the building fronting onto Atkinson Street. The remainder of the Site is occupied by tarmac hardstanding used as a car park. Hardstanding within the car parking areas was noted to be of average condition with a number of drainage/manhole covers present.

Access to the building is gained off Atkinson Street to the south and the car park is accessed off a small cobbled road (Tivoli Street) which leads from Hardman Street to the north. Current use of the Site is not considered to present a source of potential contamination.

3.3 History

In summary, throughout the identifiable history, the Site has been subject to various phases of redevelopment, initially being occupied by terraced properties in the 1700s and later in the 1800s by buildings arranged around a central courtyard which are understood to have been in use as a silk finishing works. In the late 1800s/ early 1900s a large building was constructed that occupied the majority of the Site footprint which is understood to have been used as a vehicle spares company in the 1950s. This building was subsequently reduced in size in the 1980s to create the current layout.

3.4 Geology

The geology beneath the Site has been established from a ground investigation carried out by Brownfield Solutions Ltd / Williams Brothers from the 12th – 17th October 2017. The ground conditions encountered comprised a thickness of Made Ground overlying Superficial Glaciofluvial Deposits. This was underlain by bedrock comprising the Chester Formation. A detailed description of the strata encountered in the ground investigation is summarised in 1:

Table 1: Site geology

Stratum	Depth of Top of Stratum (m bgl)	Thickness (m)	Typical Description
Hardstanding / Tarmac	0.0	0.1 – 0.3	Tarmac over concrete.
Sub Base	0.15 – 0.30	0.15 – 0.20	Light brown grey to black ashy angular to subrounded medium to coarse limestone gravel subbase.
Made Ground	0.10 – 0.20	0.13 – 2.80	Described as 'Firm brown slightly gravelly Clay. Gravel is angular fine to coarse of mixed lithologies including brick to Dark brown slightly clayey gravelly fine to coarse Sand with pockets of ash'.
	0.50	2.00	Cobbles of brick recorded between 0.50m and 2.50m in the north-eastern section of the car park.
Glaciofluvial Deposits	0.15 – 3.00	0.10 – 1.90	Brown very gravely fine to coarse SAND. Gravel is subrounded fine to coarse of mixed lithologies.
Sandstone (Chester Formation)	3.10 – 3.50	Unproven	Red fine to medium grained SANDSTONE (recovered as sand in cable percussive boreholes)

3.4.1 Aquifer Designations

According to the Environment Agency online dataset (accessed online 10/05/2018), the geological deposits underlying the Site are classified as per Table 2.

Table 2: Summary of hydrogeological properties of the main geological strata

Stratum	EA Classification	Hydrogeological Significance
Made Ground	Unproductive Strata	Contains insignificant amounts of vertically or laterally extensive groundwater
Superficial Deposits (Glaciofluvial)	Secondary A Aquifer	May be important in supporting local abstractions or in providing baseflow to rivers and streams
Bedrock (Chester Formation)	Principal Aquifer	Regionally important aquifer, likely to be used to support potable abstractions

3.4.2 Groundwater Levels

Groundwater strikes were recorded within the Chester Formation (Sandstone Bedrock) at depths ranging between 12.00m and 14.50m (22.67m and 20.3m AOD) during the ground investigation in October 2017.

Subsequent monitoring within the Sandstone bedrock identified a significant raise in the groundwater levels in BH03 to 2.02m bgl. This is possibly representative of a higher permeability layer within the Sandstone through which groundwater is moving under greater artesian pressure.

3.5 Controlled Waters

3.5.1 Surface Waters

The nearest surface water to the Site is 327m to the northwest of the Site and is identified as the River Irwell, a primary river flowing south west through Manchester.

3.6 Potential Contamination Sources

The Preliminary Environmental Risk Assessment (Report Ref: WIE13388-100-R-1.1.2-MB), issued August 2017, identified the potential for contamination to be present at the Site associated with former uses including a Silk Finishing Works (1851-1908) and a vehicle spares company (1957-1986). Garages, a hat manufactory, printing and engineering works and multi-storey car parking are also noted to have been located adjacent to the Site and are potentially contaminative land-uses.

Waterman subsequently completed a Geo-Environmental Assessment for the Site (Report Ref: WIE13388-100-R-2.2.1-GeoEnv), issued January 2018. The assessment included testing of soil and groundwater samples to confirm the levels of contamination present and the associated risks present at the Site. A programme of gas monitoring was also completed.

During the investigation no visual or olfactory evidence of contamination within the soils was noted and all soils samples were subject to screening using a PID (Photo Ionization Detector), which did not exceed 0.1ppm.

Following receipt of soil laboratory data, significantly elevated concentrations of Lead and Mercury were recorded in two samples collected from the Made Ground soils at a depth of 0.5m bgl at trial pit TPM2.

Groundwater testing was undertaken within the underlying Principal Aquifer and no recorded exceedances were noted compared to UK Drinking Water Standards (DWS), samples from shallow deposits (Made Ground and Sand) were found to be dry or of insufficient volume for testing.

Six rounds of ground gas monitoring have been completed at the Site, no recorded concentrations of methane (CH_4) or carbon dioxide (CO_2) above guideline values were noted across the three boreholes. A GSV (Gas Screening Value) of 0.0022l/hr was used for the Site, taken as the maximum concentration from the three boreholes over the six rounds of testing, this value is consistent with Characteristic Situation 1, Very Low Hazard Potential.

3.7 UXO Risk

A Detailed Unexploded Ordnance (UXO) Desk Study was completed by 1st Line Defence in September 2017. The report concludes that a Low Risk exists from UXO across the Site. The report recommends that Site Specific UXO Briefing should be undertaken to support the proposed works at the Site.

4. Risk Assessment

4.1 Summary of the Proposed Development

The proposed development includes partial demolition of the existing buildings, with retention and refurbishment of the existing façade fronting on Atkinson Street.

A new 145No. room hotel will be constructed on the Site, extending to eight storeys. The existing basement will be removed and backfilled as part of the demolition scheme.

A copy of the redevelopment plan for the hotel is included within Appendix C.

4.2 Proposed Foundation Solution

The ground conditions at the Site are summarised in Section 3.4.

Piled foundations will be adopted to support the hotel structure, as the foundation loads are likely to be significantly in excess of the design bearing resistance of the shallow soils. A concrete cantilever retaining wall will be installed along the north-western section of the hotel, with a second section running perpendicular into the centre of the development.

The specified piling platform elevation is 34.2mAOD and 32.7mAOD with an average pile length of 11.18m. These end bearing piles would key into the Chester Formation Sandstone, into beds of less weathered sandstone, identified from the ground investigation at depths greater than 8.0m bgl. The layout plan shows 90No. 600⌀ and 27No. 450⌀ piles.

A proposed pile layout drawing is provided within Appendix D (V.E. Exercise A03 – 23.03.2018).

All piled foundations will be formed using Continuous Flight Auger (CFA) techniques and will be constructed of reinforced concrete cast in-situ. This technique involves the extraction of a core of soil and replacement with a pile. The core will be drilled using an auger to create a void. The auger is then slowly withdrawn whilst being rotated to remove the ground and concrete is simultaneously pumped to the toe of the auger while the pressure and volume is controlled to maintain a positive pressure in the concrete in the ground. Reinforcement can then be installed. The side of the pile is always supported by the pressure in the concrete reducing the likelihood of the hole collapsing, minimising the risk of creating a preferential flow pathway.

4.3 Pollutant Linkages of General Concern

A number of potential pollution scenarios are identified as being a concern during foundation works by the EA in the Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention (NGWCLC Report NC/99/73) document. They are replicated below:

1. '**Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer'** - Through the introduction of piles allowing contaminated groundwater and leachates to move downwards through aquitard layers into underlying groundwater or between permeable horizons in a multi layered aquifer;
2. '**Creation of preferential pathways through a low permeability surface layer, allowing migration of landfill gas, soil gas or contaminant vapours to the surface'** – The introduction of piles, allowing surface water infiltration into contaminated ground (thus creating leachate) or allowing the escape of landfill or other gasses;

3. '**Direct contact of site workers and others with contaminated soil arisings which have been brought to the surface'** – the pile arisings brought to surface would allow contact with site workers not considered during the final development;
4. **'Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials'** (where the secondary effects are to increase the potential for contaminant migration);
5. '**The driving of solid contaminants down into an aquifer during pile driving'** – the trapping of materials and breaching a low permeability layer causing potential contamination of a previously protected strata; and
6. **'Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout'**.

A number of the pollution scenarios are not relevant at the Site. The following justification is provided and the key scenarios are continued into the risk assessment.

4.3.1 Creation of preferential pathway through an aquitard

The ground conditions at the Site recorded during the ground investigation comprised of a thickness of Made Ground over Glaciofluvial Deposits, recorded as Sand, with the Chester Pebble Beds (Sandstone) recorded from a depth of 3.0m to 3.5m bgl. There were no low permeability layers / aquitards recorded overlying the Principal Aquifer at the Site.

This potential pollution scenario is not considered to be relevant at the Site as the Site soils sit directly above the Principal Aquifer therefore introducing piles into the ground will not create a preferential pathway through a low permeability layer.

4.3.2 Creation of preferential pathway through a low permeability surface layer allowing migration of landfill gas, soil gas or contaminant vapours to the surface

As detailed in Section 3.4, other than a surface hardstanding layer, a low permeability surface was not recorded at the Site acting as a cap to the migration of gases. A period of ground gas monitoring was undertaken at the Site which recorded limited ground gas and classified the Site as Characteristic Situation 1.

This pollution scenario is not considered to be relevant at the Site as a low permeability cap was not recorded, nor were significant volumes of ground gas recorded during the monitoring period.

Section 4.4 below outlines the potential Source-Pathway-Receptor linkages that relate to the works proposed at the Site, together with an assessment of potential impacts.

4.3.3 The driving of solid contaminants into an aquifer during pile driving

The proposed method of piling at the Site is a non-displacement continuous flight auger, which removes soils to allow the piles to be formed, rather than driving material vertically.

It is considered the risk from this pollution scenario to the Site is low as this method is not proposed to be adopted.

Pathway-Receptor linkages that relate to the works proposed at the Site, together with an assessment of potential impacts.

4.4 Predicted Impacts of Proposed Foundation Works

Table 3: Assessment of Predicted Impacts from Construction Methods

Construction Aspect	Potential Pollutant Linkage	Likelihood of Potential Impact	Justification
Installation of CFA Piles through the Glaciofluvial Deposits (Secondary A Aquifer) into the underlying Chester Pebble Beds (Principal Aquifer)	Direct contact of Site workers and others with contaminated soil arising that have been brought to the surface.	Low	Risks posed to construction workers coming into direct contact with the contaminants within the Made Ground (Lead, Mercury and TPH's). The information within this report should be incorporated in Health and Safety Plans and Risk Assessments. Additionally, the mandatory use of PPE should be adhered to at all times. All Site workers should be made aware of the potential for additional unrecorded contaminants within the Made Ground.
	Direct contact of the piles of engineered structures with contaminated soil or leachate causing degradation of column materials.	Low	The specification of concrete used within the piles is based on results from SD1 testing, the Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC). The resultant classifications are DS-1 AC-1 for all strata encountered, as such designed to resist chemical attack from potentially aggressive ground conditions.

5. Quality Control and Quality Assurance

The average depth of the piles is anticipated to be 11.18m with a maximum of 13.0m. Piles will be installed in accordance with the requirements within the design specifications set out by the specialist piling contractor (Cohesion Piling Company Ltd) within their Piling Method Statement, included in Appendix E.

The piles will be monitored during construction to ensure compliance with the specification. Piles will be cast in-situ using reinforced concrete, with concrete pumped into the open void to ensure that the void is completely filled and a continuous pile structure is produced. The volume of concrete will be monitored during the installation works and a number of piles will be subject to testing to confirm their integrity and load bear capacity.

Six ground gas monitoring visits were conducted at the Site, the results classified the Site as Characteristic Situation 1 – Very Low Hazard Potential and therefore no special precautions will need to be considered within the development. Additionally, the Site is within a non-radon affected area, as such it is expected that radon protection measures are not required on the Site. However, this approach should be confirmed with the local authority building control officer.

The concrete used within the construction of floor slabs, piles and pad foundations will include concrete designed to DS-1 AC-1 in accordance with BRE SD1 Design Sulphate and Aggressive Chemical Environment for Concrete classifications. This will ensure the concrete is not susceptible to chemical attack by potentially aggressive ground conditions.

A Preliminary Waste Classification Assessment has been carried out within Section 11 of the Geo-Environmental Assessment for the Site (Report Ref: WIE13388-100-R-2.2.1-GeoEnv), once specific information is known regarding how the waste will arise, and what off-site recovery or disposal options a detailed Waste Classification Assessment should be undertaken, in accordance with the EA's technical guidance *WM3: Waste Classification – Guidance on the classification and assessment of waste*.

The potential for UXO has been investigated by 1st Line Defence and discussed in Section 3.7, with the risk at the Site assessed as Low.

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6. Methodology, Mitigation and Monitoring

6.1 Obstructions

Invicta House still occupies the southern and eastern extent of the Site. It is noted within the development proposal that Invicta House will undergo partial demolition with retention and refurbishment of the existing façade fronting on Atkinson Street.

The existing basements to Invicta House will be excavated and backfilled to a suitable specification.

It is understood that buried services underlying the Site, not currently covered by buildings, were removed in October 2017 by Midlands Surveys. Potential services remaining beneath the Site should be investigated prior to any further intrusive ground investigations or any founding works, it is anticipated that this will take place as part of the overall demolition scheme.

6.2 Waste management

A preliminary Waste Classification Assessment has been completed within Section 11 of the Geo-Environmental Assessment for the Site (Report Ref: WIE13388-100-R-2.2.1-GeoEnv). The preliminary assessment highlighted samples from BH02 and BH03 as hazardous and under the European Waste Catalogue, classified as EMC Code - 17 05 03* described as *'Soils and stones containing hazardous substances'*.

The proposed CFA piling method will generate soil arisings from both the Made Ground and underlying Glaciofluvial Deposits together with the sandstone stratum. It is recommended that should soil arisings need to be disposed of off-site, suitable testing of the soils is completed and a Waste Classification Assessment is completed.

Where materials are proposed for re-use then this will be undertaken in accordance with the CL:AIRE Definition of Waste: Code of Practice (DoWCoP), subject to appropriate sampling and testing, risk assessment and compliance with the requirement of the DoWCoP.

6.3 Monitoring for Unforeseen Contamination

The pile arisings should be inspected and monitored for previously unknown / unforeseen contamination. Should visual or olfactory evidence of contamination be observed, a Waterman Environmental Engineer should attend site and advise on an appropriate course of action.

6.4 Variable Deep Groundwater Levels

Groundwater strikes were recorded within the Sandstone bedrock at depths ranging between 12.00m and 14.50m bgl (22.67m and 20.3m AOD). Monitored groundwater levels within piezometers installed within the Sandstone bedrock were recorded to range between 10.27m and 11.07m bgl (23.77m and 24.46m AOD) in borehole BH01 and BH02. However, the groundwater level in BH03 was recorded at a higher level at 2.02m bgl (32.65m AOD) during all monitoring visits and was found to be flowing over the top of the piezo pipe and flooding the well headworks.

The groundwater was struck at borehole BH03 at a depth of 12.0m bgl and conditions observed at borehole BH03 are noted to be different to that encountered within BH01 and BH02 and are possibly representative of a higher permeability layer within the Sandstone through which groundwater is moving under greater artesian pressure resulting in the elevated groundwater level recorded in the piezo monitoring pipe.

Dependant on the depths of the piles in this area of the Site, the variable groundwater depths and pressures should be noted and accounted for during the piling works.

6.5 Noise and vibration

A Method Statement, covering noise and vibration, will be prepared by the specialist piling contractor.

Noise levels are expected at times to be moderate. Appropriate PPE should be worn by site personnel.

7. Summary and Conclusions

A Foundation Works Risk Assessment in accordance with the EA's publication *Piling and penetrative ground improvement methods of land affected by contamination: Guidance on pollution prevention (*NGWCLC Report NC/99/73)' has been undertaken and the relevant pollution scenarios assessed.

It is proposed to install a number of piled foundations at the Site, which will penetrate through the Made Ground and Superficial Deposits into the underlying sandstone bedrock (Chester Formation). Piles will be keyed into the Chester Formation and formed using non-displacement continuous flight auger techniques and will be constructed of reinforced cast in-situ concrete to support the proposed 145No. room hotel development.

The ground investigation identified the presence of heavy metals within the Made Ground on Site, the potential for these contaminants to leach into the underlying aquifer following the construction of piles is considered to be Low. To support this conclusion the groundwater sampling from the underlying Principal Aquifer also revealed no elevated concentrations of contaminants suggesting limited leaching.

The assessment identified that the construction of the piles and the likelihood of potentially adverse impacts resulting from the proposed piling activities is considered to be Low, provided that works are carried out in accordance with appropriate Risk Assessments and Method Statements.

Waterman should be alerted if unexpected contamination is identified at any time during the piling works and it may be necessary to update this Risk Assessment. The ground conditions reported relate only to the point of excavations during the ground investigation (October 2017) and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the Site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions, these cannot be determined with complete certainty.

In conclusion, the proposed piles are considered suitable for the proposed development at the Site and it has been demonstrated that there is no resultant unacceptable risk to the groundwater.

GLOSSARY

For the purpose of this report, the following terms and definitions apply (see BS 10175:2001).

Accuracy	Level of agreement between true value and observed value.
Conceptual Exposure model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. **Note 1:** The conceptual exposure model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water. **Note 1:** There is no assumption in this definition that harm results from the presence of the contamination. **Note 2:** Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. **Note 3:** Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters. **Note 1:** See Section 104 of The Water Resources Act 1991.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
Risk	Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter. **Note 1:** In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived. **Note 1:** This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

APPENDICES

Appendix A Site Plans

- **Site Location Plan (Ref. WIE13388-101-GR-FWRA-A1)**
- **Site Layout Plan (Ref. WIE13388-101-GR-FWRA-A2)**

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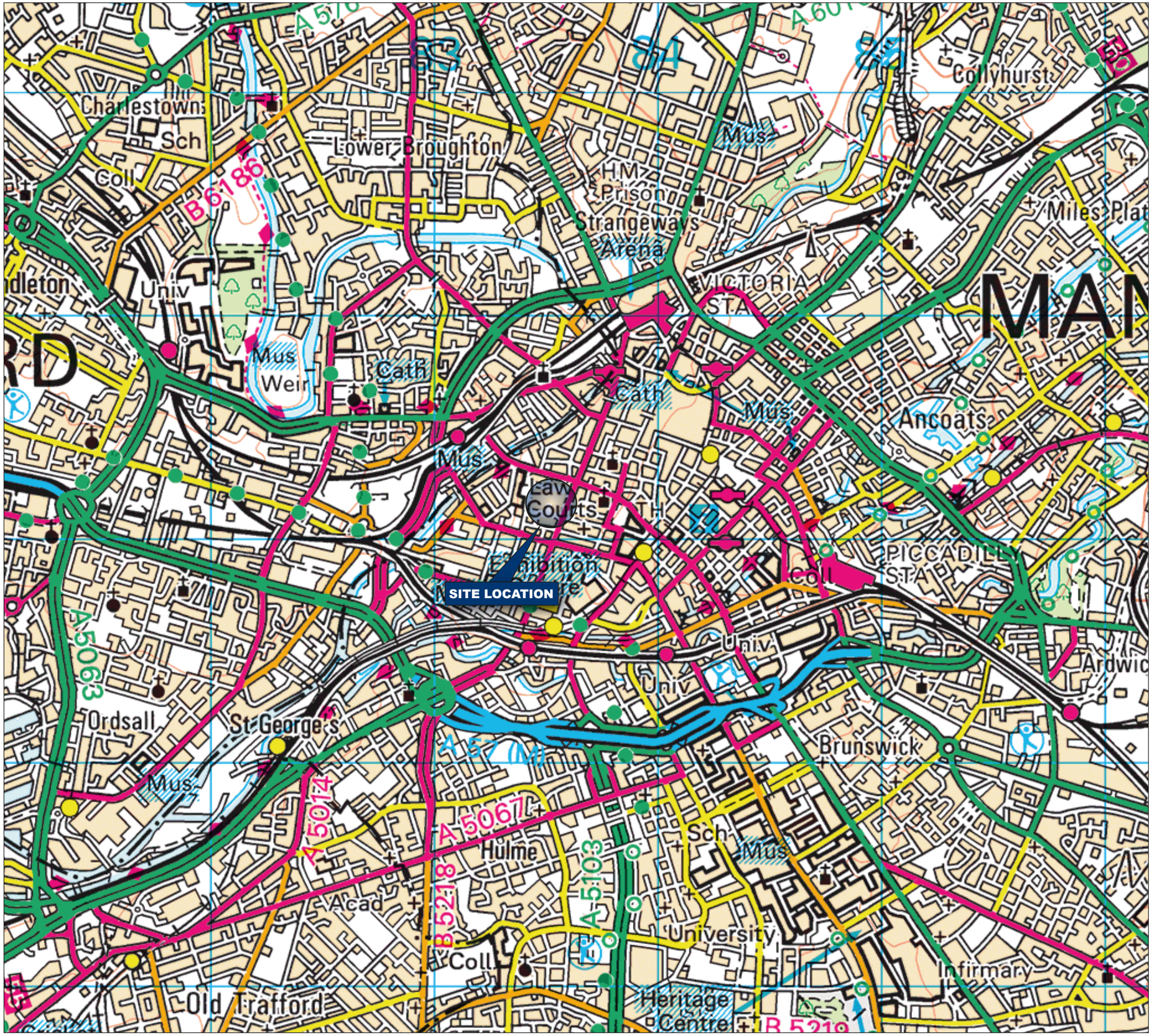

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Project Details	WIE13388-101: Moxy Hotels
Figure Title	Figure A1: Site Location Plan
Figure Ref	WIE13388-101_GR_FWRA_A1A
Date	May 2018
File Location	\\s-lncs\wiel\projects\wie13388\101\graphics\fwra\issued figures

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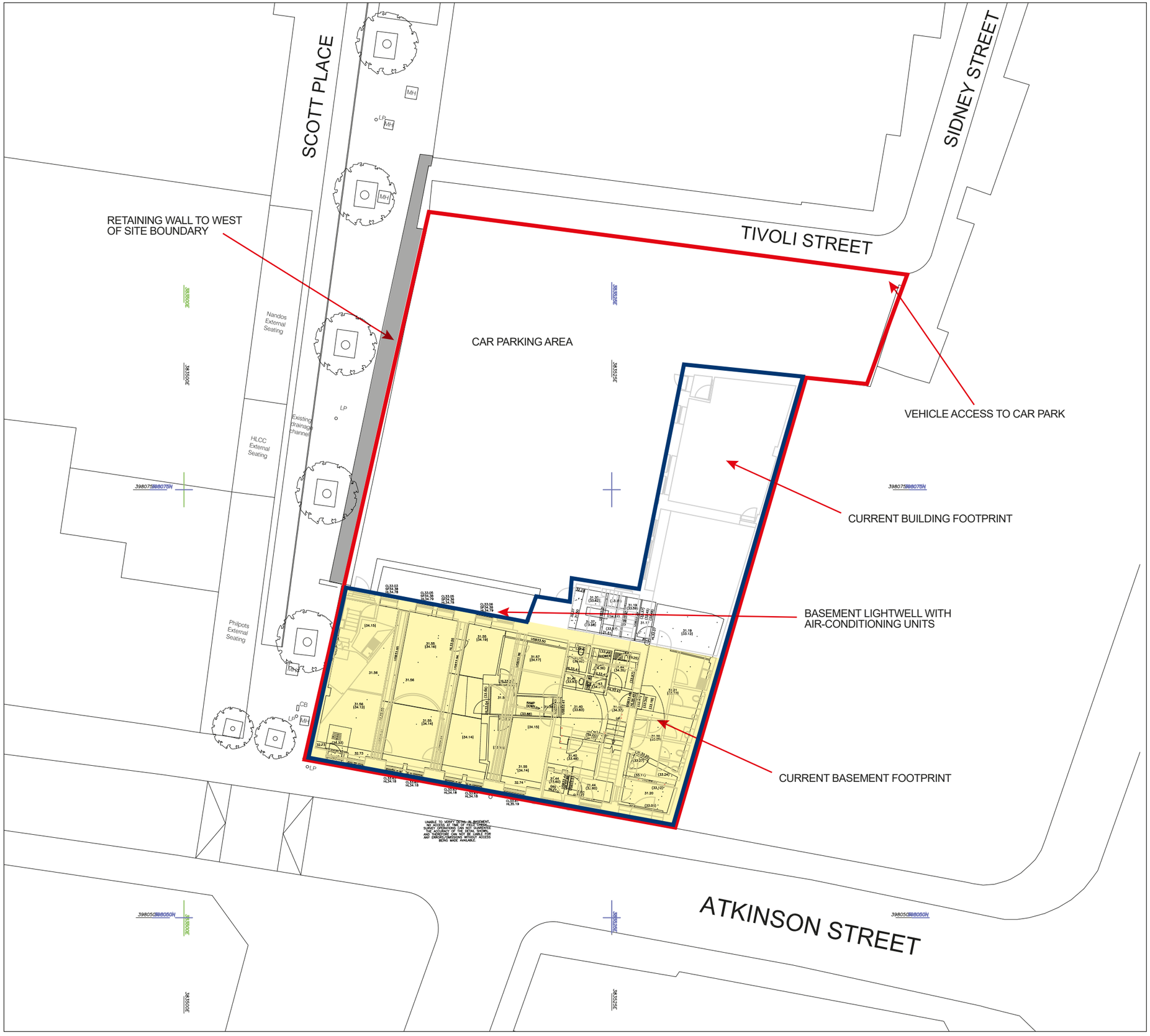
Site Boundary



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Project Details	WIE13388-101: Moxy Hotels
Figure Title	Figure A2: Site Features Plan
Figure Ref	WIE13388-101_GR_FWRA_A2A
Date	May 2018
File Location	\\s-lncs\wiel\projects\wie13388\101\graphics\fwra\issued figures

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Appendix B Site Reconnaissance Photos



Plate 1: South of site fronting onto Atkinson Street.



Plate 2: Retaining wall to west of Site. Photo looking towards the south.



Plate 3: Car parking area in north of Site and buildings present on southern and eastern boundaries.



Plate 4: Lightwell and air-conditioning units to north of building



Plate 5: Building internal office use.



Plate 6: Access to car parking are off Hardman Street to the north.

Project Details	WIE13388-101: Moxy Hotels
Figure Title	Figure B1: Site Location Plan
Figure Ref	WIE13388-100_GR_FWRA_B1A
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Appendix C Proposed Redevelopment Plans



Ground Floor Plan

Scale: 1:200

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revisions //	by //	date //
A Issues to brand for information	NVR	31.08.17
B Plan revised further to circulation of proposed B.O.H arrangement issued 06.10.17. Lift shaft depth increased to 2670mm. Column positions in abeyance. Structural Engineer to advise.	EA	11.10.17
C Structural Layout revised to reflect Structural Engineer's latest overmarked column locations. Shear wall to extend through Staff Changing per previous Structural intent.	EA	30.10.17

Note:
Final co-ordination of sheer walls and column positions to take place. Locations of columns taken straight from Waterman Proposals for review purposes.

0m 2m 8m

Merchant Exchange
20 Bell Street
Glasgow
G1 1LG

+44(0)141 552 2194
weareica.com

project title //
Invicta House
Manchester
Moxy Hotel

drawing title //
Proposed Ground Floor Plan

issue stage //
TENDER

date //	drawn //	scale @ A3 //
JAN17	NVR	1:200

project //	dwg number //	revision //
781	AL(00)011	C

Appendix D Piling Layout Plans

POTENTIAL SHEET PILE LOCATION

CONCRETE CANTILEVER RETAINING WALL

PILE COUNTS

PREVIOUS SCHEME - (INC. CONTIG PILES)	148 No.Off 600 Ø 27 No.Off 450 Ø
V.E. SCHEME -	90 No.Off 600 Ø 27 No.Off 450 Ø

GENERAL NOTES

CONTIGUOUS PILED WALL REMOVED AND REPLACED WITH DISCRETE PILE CAPS AT COLUMN SUPPORT LOCATIONS. A COMBINATION OF TEMPORARY SHEET PILED WALLS AND PERMENENT REINFORCED CONCRETE CANTILEVER RETAINING WALLS ARE TO BE USED AT STEPS IN LEVELS

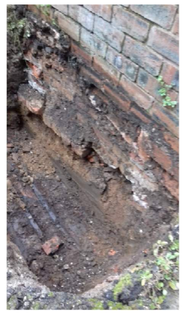
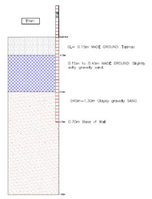
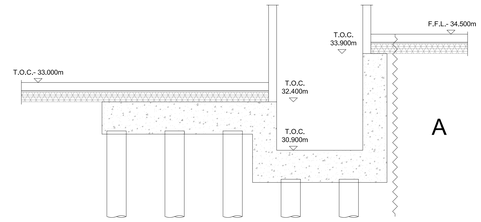
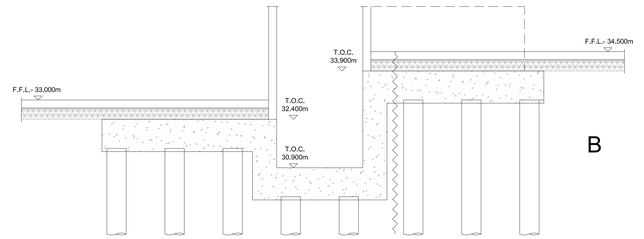


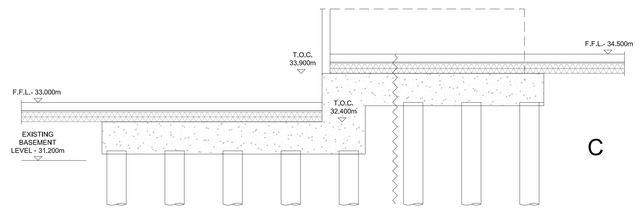
PHOTO OF TPM 1

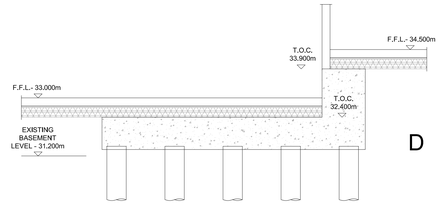


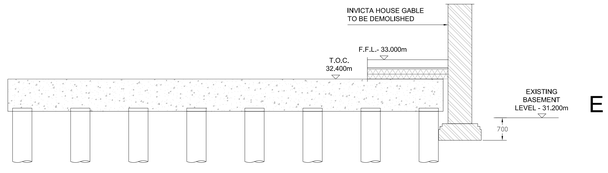
LOG OF TPM 1











Appendix E Piling Method Statements

METHOD STATEMENT

CONTINUOUS FLIGHT AUGER BORED PILES (CFA)

Site: Moxy Hotel, Atkinson Street, Manchester M3 3HH
Client: Bardsley Construction Ltd
Author: Wayne Adams Date: 27 April 2018
Contract No: 12299 Revision: 00

Cohesion Piling Company Ltd
Piled Foundations & Underpinning

I confirm that I have read, understood, agreed and will comply with, the contents of this Method Statement				
Revision	**Name**	**Position**	**Signature**	**Date**

NB – This is to be read in conjunction with the associated Risk Assessment

CONTENTS

1.0 Introduction
2.0 Scope of Works
3.0 Equipment to be Used
4.0 Sequence and Method
5.0 Emergency Procedures
6.0 Appendices

CONTINUOUS FLIGHT AUGER BORED PILES (CFA)

Site: Moxy Hotel, Atkinson Street, Manchester M3 3HH
Client: Bardsley Construction Ltd
Author: Wayne Adams Date: 27 April 2018
Contract No: 12299 Revision: 00

Cohesion Piling Company Ltd
Piled Foundations & Underpinning

1.0 INTRODUCTION

1.1 GENERAL

This method statement has been produced to document the risks, control procedures and methodology associated with works to be undertaken on this site by Cohesion Piling Company Limited and their subcontractors. Reviews & amendments by Cohesion piling contract Manager.

Site working hours will be 07.30am to 6.00pm Monday to Friday.

The works on site will be supervised by a working foreman, (SSSTS) and the site crew will comprise a piling rig driver, a slinger / banks man and a pump man. (Visiting steel fixer). The contract will be managed by Wayne Adams – Tel: 07712 358349.

1.2 PREPARATION

Working Platform Design – undertaken prior to commencement
Pile Design – submitted prior to commencement
Concrete Mix – submitted prior to commencement
Setting out individually numbered pile positions.

1.3 CONTROL MEASURES BY COHESION PILING

- Method Statement
- Risk Assessments
- Trained Workforce – checked at Induction
- Equipment Certificates – checked on delivery
- Pile Design
- Concrete design mix – approved prior to commencement

1.4 CONTROL MEASURES BY THE PRINCIPAL CONTRACTOR

- Working Platform Design Certificate – provided prior to commencement
- Permit to Dig – provided prior to commencement
- Setting out individually numbered pile positions
- Background and task lighting as necessary for the safe execution of the works
- Welfare facilities including mess cabin and drying room
- Hoarding and/or screens to protect the public and third-party property
- Wheel and road cleaning facilities as required

2.0 SCOPE OF THE WORKS

The work comprises of the following:

- Install 117 number x 450mm diameter CFA Piles to a depth of upto 13m
- Provision of plant, equipment and labour to undertake the piling works.
- Provide installations records.
- Supervision of the works
- Carry out operations in line with this Method Statement and associated Risk Assessments

3.0 EQUIPMENT TO BE USED

CFA Piling Rig. The rig is unguarded in line with FPS guidance dated December 2013
Augers
Jetwash bowser
Diesel bowser, (Bunded)
Static concrete pump and hoses
MEWPS for working at height
13te 360^0 track mounted excavator – by main contractor
250cfm compressor and airlines – by main contractor

All plant and equipment will be used and maintained in accordance with the manufacturer's instructions and standard procedures.

4.0 SEQUENCE & METHOD

4.1 SEQUENCE

Access to Site

Access is from:	Atkinson Street through a 5.2m wide x 4.8m high opening in the existing façade.
Delivery restrictions:	During normal working hours with the exception of the piling rig which will be delivered/collected early morning.
Parking:	One van on site, subject to room being available.

Delivery of Plant and Equipment

The piling rig will arrive on a low-loader and the ancillary equipment will arrive on a Hi-Ab wagon (or similar). All will be delivered and unloaded adjacent the works.

General

All site personnel will attend a site-specific safety induction from the principal contractor prior to commencing work on site, hold a minimum basic site skills CSCS card and, if required, the appropriate CPCS / NPORS card for the activity they will undertake.

The minimum PPE requirements are as follows:

Safety helmet
High Visibility coat / vest
Safety boots with steel toe caps and mid-sole
Gloves
Ear protection where levels exceed 85dbA

Task Specific PPE requirements are as follows:

Light eye protection when washing out and blowing out concrete equipment

Prior to piling works commencing all known services will be located and identified by the principal contractor and a Permit to Dig shall be issued.

A hot works permit to be issued by the principal contractor, if required.

4.2 METHOD

General

The foreman will ensure that all necessary safety controls and environmental protection measures outlined in the Method Statement and Risk Assessments are in place and remain in place throughout the works.

The principal record of inspection is the Pile Log Sheet.

The piles will be bored from a platform prepared and maintained by the principal contractor. All pile locations shall be cleared of obstructions, services, etc. and suitably backfilled by the principal contractor in advance of the piling works.

The piles will be set out by the principal contractor by means of steel pins driven into the ground with numbered caps.

The piles will be bored to the following tolerances:

Plan position at platform level	+/- 75mm
Verticality	1 in 75

A series of trail bores may be carried out before commencement of piling works to ascertain the ground conditions and boring characteristics, and confirm they are in accordance with the site investigation information provided. Any discrepancy will be reported immediately by the foreman to the principal contractor.

Before the commencement of the first pile each day, the hoses and pipeline shall be lubricated with a primer pump mix. This operation may be repeated during the day if the pump and hoses have been washed out.

Prior to commencement of a pile, the foreman will ensure that sufficient materials and resources are available to complete the pile. The principal record of inspection is the Pile Log Sheet.

The foreman will ensure that movement of the rig does not damage previously constructed piles by either travelling over or surcharging them. The pile position shall be sufficiently distant from recently cast piles to prevent damage occurring during boring. Any movement of concrete/grout in recently constructed piles that occurs during the boring of adjacent piles will be reported immediately by the foreman to the principal contractor. Revised instructions will be issued if necessary.

Rigging and De-Rigging

Rigging and subsequent de-rigging will be undertaken with assistance from an operative working in a mobile elevated work platform (MEWP).

The MEWP will be unloaded and erected in accordance with the manufacturer's instructions.

The piling rig mast will be unfolded, assembled and raised to vertical in accordance with the manufacturer's instructions and with assistance from the attendant excavator and MEWP.

The following process will then be adopted for rigging the augers:

1) The first auger will be lifted into position using the rig auxiliary winch and located within the auger guides at the base of the mast.
2) Once the auger section is in place, the MEWP operator will manoeuvre the top of the auger into alignment with the drill head and connect them together with metal pins.
3) The drill head and auger are raised, another auger is winched into place and connected to the first auger with metal pins.
4) The process is repeated until the required auger string has been assembled.
5) The operative will then lower & dismount from the MEWP, and move it away.

Piling

The rig will be tracked into approximate position and a bung inserted in the bottom of the auger (unless an auger flap is being used).

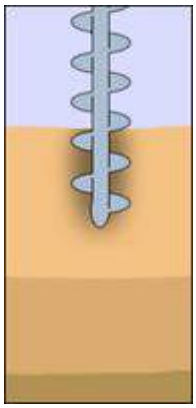
The auger is centred vertically over the pile position. The rig mast is checked and adjusted for verticality. The hydraulic mast foot is then lowered to the ground.

The banksman will check the position of the auger tip, final adjustment of level and verticality of the rig mast will be undertaken and the auger tip will be lowered to the ground by the rig operator.

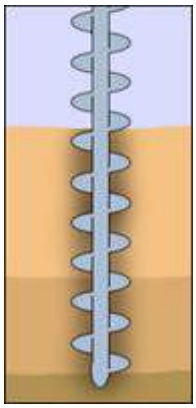
Piling then proceeds as follows (see also diagram below):

1) The augers are rotated and advanced into the ground in a manner suitable to the ground conditions, a Kelly bar may be engaged to extend the stroke of the augers if required.
2) Once the drill augers have reached the design depth, the auger will be lifted by up to 100mm to release the bung prior to pre-charging the auger stem with concrete.
3) Concrete is pumped, under pressure and at a sufficient rate to ensure a continuous and monolithic shaft, to the bottom of the auger through its hollow stem. When extracting the auger, bore spoil on the auger is cleared using the auger cleaner on the piling rig assisted, if necessary, by the attendant 360o excavator. Cleaning of the auger by hand may be necessary when working close to other operations or avoid excessive splashing.
4) The auger is withdrawn at a controlled rate of extraction, such that the volume of concrete placed is slightly greater than the theoretical volume of the pile shaft. The extraction rate is not necessarily constant and may be adjusted to allow for local variations in soil conditions. The extraction rate is checked against "real time" parameters with the aid of a N. D. Technology CFA pile monitor system fitted to the rig (PL20 or similar). The CFA pile monitor comprises transducers fitted on the piling rig. These are connected to a portable computer console with keypad and graphics display in the operator's cab. The system facilitates computer-aided construction of the CFA piles to a template of predefined construction parameters.

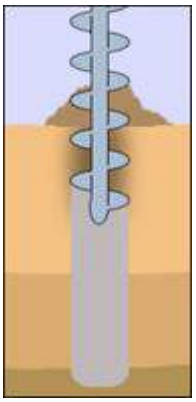
5) On completion of the pile the system checks the monitored construction parameters against the template and alerts the operator to any discrepancies via a status system. Should the pile contain non-conformities identified to be "driver error" they will be corrected by re boring whilst the concrete remains plastic. Non-conformities (accepting the known limitations of the system) will be brought to the site management's attention for review.
6) Should a blockage occur the auger is extracted by rotating anti-clockwise to leave as much soil supporting the hole as possible. See Blowing Out procedure below for clearing blockages. In all instances, once the blockage is cleared the hole is re-drilled to a founding level slightly deeper than originally achieved.
7) Bore spoil arising's and concrete over break from boring and construction is removed from the pile head by a full time attendant 360o excavator.
8) The concrete pile is cast to ground/working platform level. Pile shaft concrete cannot be left below the existing piling platform. A minimum distance of 500mm is recommended from piling platform level down to pile cut off level to ensure sound concrete at the pile head.
9) The remaining arising's and concrete overbreak from the bore is removed by the full time attendant 360^0 excavator and the top of the concrete checked for contamination.



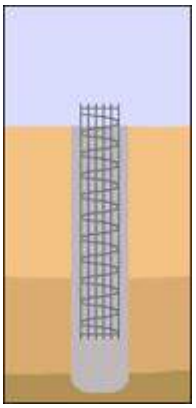
The cutting head of the auger is fitted with an expendable cap



The auger is screwed into the ground to the required depth.



Concrete is pumped through the hollow stem, blowing off the expendable cap under pressure.



Maintaining positive concrete pressure the auger is withdrawn and the reinforcement is placed into the pile up to the required depth.

Pile Reinforcement

All reinforcement material shall be from a CARES approved supplier. A designated area will be assigned by the main contractor for steel fixing. The steel fixing trestles will be positioned on firm ground (preferably an area of the piling platform).

Steel will be lifted onto the fixing trestles manually, or by using the attendant machine if in bundles weighing more than 25kg.

Steel fixers will fabricate one cage at a time using soft annealed tie wire, sufficiently tied to allow handling and placement.

Fabricated cages will be lifted off the trestles and stock piled within an agreed storage area (see lifting requirements below).

The Foreman will check that the reinforcement complies with the design before placing.

Reinforcement will be lifted and plunged into the wet concrete to the required level (two men if the cage weighs more than 25kg, use the attendant excavator and/or auxiliary line on the rig for cages in excess of 50kg).

Adequate numbers and rows of spacers will be used on the reinforcement cage to provide the required cover, this will consist of at least 3 no. at the top and 3 no. at the bottom of the cage.

The Foreman and banksman will ensure that there is no debris or mud on the reinforcement and that no contamination is pushed into the concrete by the reinforcement.

Care and attention is required to ensure that the excavator bucket does not catch the reinforcement cages within previously installed piles.

De-bonding foam sleeves can be attached to the reinforcement projecting above the helical to aid the trimming process, if requested. Due to the method of installation there can be no guarantee of the finished level of debonding foam.

Records of all work carried out will be kept on Pile Log Sheets.

Blowing Out

At the end of the shift the concrete hoses require clearing of concrete ready for work the next day. Blowing out is undertaken in 2 passes, as below:

First pass:

a) Introduce a concrete blow out ball into one end of the concrete line.
b) Attach the blowout adapter to the same end of the flexible hose and a ball catcher to the other end.
c) Connect the blow out adapter to the 250cfm compressor and gradually open the compressor valve.
d) Blow the ball through the lines.

Second pass: As stated in the first pass but with the addition of water.

In the event of a Line blockage:

a) Switch off the compressor and release the air pressure at the blow out chamber.
b) Carefully break the joints in the line being aware of any potential trapped air within the lines.
c) Clear the obstruction and repeat the blow out procedure.

5.0 EMERGENCY PROCEDURES

All site operatives are to be briefed and made aware of main access/egress routes and emergency assembly points at the initial induction. Designated routes are to be kept clear at all times.

The principal contractor shall deploy adequate First Aid trained personnel on site during the works and First Aiders will be identified during the induction process.
A suitably stocked first aid kit and eye wash station shall be kept on site by the principal contractor.

In the event of an emergency the principal contractor or the appointed person shall, if required, contact the emergency services.

All accidents are to be recorded in the site accident book and subsequently reported to Cohesion Piling Company Ltd's office.

6.0 APPENDICES

The nearest Accident & Emergency department is located at:

Manchester Royal Infirmary

Oxford Road

Manchester

M13 9WL

Site Address: Moxy Hotel Atkinson Street Manchester M3 3HH	**RISK ASSESSMENT FOR CONTINUOUS FLIGHT AUGER PILES (CFA)**	
Contract Number: 12299	Author: Wayne Adams Revision: 00	Date: 27 April 2018

COHESION PILING COMPANY LTD

Key to Risk Rating:

Likelihood (L)	Severity (S) 1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Likelihood (L)		Severity (S)	
1	Very Unlikely	1	Minor injury, no lost time, no damage
2	Unlikely	2	Minor injury, less than or equal to 3 days lost time, minor damage
3	Likely	3	Reportable injury, 7 days lost time, temporary disruption to operations
4	Very Likely	4	Major injury, damage, theft
5	Certain	5	Fatality, major damage, industry disruption
Risk Rating (RR) = Likelihood (L) x Severity (S)			

Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	GENERAL SITE SAFETY	Lack of General Awareness	3	3	9	• All operatives to be inducted onto site. • All operatives to have relevant training, eg CSCS, CPCS. • Revisions to Safety Risk Assessments are to be cascaded down by Toolbox talks	3	1	3	All Operatives	Cohesion Piling Contract Manager
	GENERAL SITE SAFETY	Lack of personal protection	3	3	9	• All operatives to wear the correct PPE, ie Safety Helmet, Safety Footwear, Hi-Visibility Vest, Gloves. • Wear additional task specific PPE as appropriate.	3	1	3	All Operatives	Cohesion Site Foreman
	GENERAL SITE SAFETY	Ingesting harmful products	5	3	15	• All operatives to wear PPE in accordance with COSHH data sheets for the product being handled. • Remove any contaminated clothing, do not smoke in the work area, and wash at the end of each shift and before smoking.	5	1	5	All Operatives	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	GENERAL SITE SAFETY	Ingesting harmful excavated material	5	3	15	• All operatives to wear the correct PPE for the material being excavated. • Remove any contaminated clothing, do not smoke in the work area, and wash at the end of each shift and before smoking.	5	1	5	All Operatives	Cohesion Site Foreman
	GENERAL SITE SAFETY	Poor operative hearing Risk to himself and others	5	3	15	• Operatives with impaired hearing to wear hearing aids at all times	5	1	5	All Operatives	Cohesion Site Foreman
	TRANSPORT & DELIVERIES	Movement of delivery vehicles	5	3	15	• Delivery vehicles to be guided by the banksman when on site. • All site operatives to be made aware of vehicle reversing dangers. No reversing without banksman. • Limit vehicle speed.	5	1	5	Banksman	Cohesion Site Foreman
	UNLOADING	Working on the trailer	3	5	15	• No operative will access or work on the trailer without fall prevention measures in place. (Edge protection)	5	1	5	All Operatives	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	LIFTING	Lifting of materials or plant	4	3	12	• Avoid standing beneath suspended loads. • Use the appropriate lifting equipment/slings • Operatives and equipment to hold correct certification.	4	1	4	Banksman	Cohesion Site Foreman
	LOLER	Condition of lifting equipment and accessories	4	3	12	• Ensure ALL lifting equipment is inspected annually. • Ensure ALL lifting accessories are inspected every 6 months.	4	1	4	Cohesion Piling Contract Manager	Cohesion Piling Contract Manager
	LOLER	Condition of lifting equipment and accessories	4	3	12	• Ensure ALL lifting equipment is inspected weekly. • Ensure ALL lifting accessories are inspected daily/weekly as required by LOLER, and any damages reported immediately for repair or discarding. • Ensure all lifting equipment is within certificate date	4	1	4	Cohesion Foreman & Banksman	Cohesion Piling Contract Manager
	PUWER	Condition of work equipment	4	3	12	• Ensure all equipment is inspected and tested every 12 months. • Ensure all PAT testing is in date for electrical equipment.	4	1	4	Cohesion Piling Contract Manager	Cohesion Piling Contract Manager

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Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	PUWER	Condition of work equipment	4	3	12	• Ensure all equipment is inspected weekly. • Check equipment is in good working order. • Check PAT testing is in date for electrical equipment.	4	1	4	Cohesion Site Foreman	Cohesion Contract Manager

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Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	ENVIRONMENT	Impact on the environment resulting from piling operations.	4	3	12	• Waste (including bore spoil) to be kept to a minimum. The handling & removal being dealt with by main contractor • Safe transport, handling, storage and use of all substances and materials to ensure they are not released into the environment • Fuel will be stored in double-bunded, lockable tanks and all refuelling operations must be supervised and kept away from surface water drains. • Bowsers, drums etc to be kept in agreed specific areas when not being used. Spill kits and drip trays to be provided for refuelling & oils etc. • Any spill must be contained and reported to the main contractor immediately.	4	1	4	All piling operatives	Cohesion Site Foreman

Site Address: Moxy Hotel Atkinson Street Manchester M3 3HH	**RISK ASSESSMENT FOR CONTINUOUS FLIGHT AUGER PILES (CFA)**	
Contract Number: 12299	Author: Wayne Adams Revision: 00	Date: 27 April 2018

COHESION PILING COMPANY LTD

Key to Risk Rating:

Likelihood (L)	Severity (S) 1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Likelihood (L)		Severity (S)	
1	Very Unlikely	1	Minor injury, no lost time, no damage
2	Unlikely	2	Minor injury, less than or equal to 3 days lost time, minor damage
3	Likely	3	Reportable injury, 7 days lost time, temporary disruption to operations
4	Very Likely	4	Major injury, damage, theft
5	Certain	5	Fatality, major damage, industry disruption
Risk Rating (RR) = Likelihood (L) x Severity (S)			

Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	MANUAL HANDLING	Personal injury Injury to bystanders	3	3	9	• Ensure mechanical lifts are used whenever possible and practicable. • Split loads down into smaller/lighter loads whenever possible. • Ensure the ground around the lift is firm and as level as possible. • Check for a clear path and remove trip hazards. • Ensure the area is well lit. • Instruct bystanders to move out of the way. • Always adopt lifting guidance given in Manual Handling toolbox talk.	3	1	3	All piling operatives	Cohesion Site Foreman
	DRAINS & SERVICES	Interruption of services. Leakage of gas, sewage. Electric shock	3	3	9	• Live services to be identified and clearly marked on site. • Remove, divert, isolate, protect before piling. • Operate permit to dig system.	3	1	3	Principal Contractor	Cohesion Site Foreman
	WORKING PLATFORM	Safe support of plant & equipment	5	4	20	• Working Platform certificate required.	5	1	5	Principal Contractor	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	PILING	Personnel working adjacent to piling rig	5	3	15	• All plant movements to be supervised by banksman. • All piling crew and site personnel to be made aware of the slewing, tracking and reversing movements of pilling rig. • Only piling operatives and authorised personnel to enter the work area.	5	1	5	Banksman	Cohesion Site Foreman
	PILING	Injuries due to entrapment in rotating augers	5	3	15	• Banksman to ensure no-one stands within 2m of rotating augers.	5	1	5	Banksman	Cohesion Site Foreman
	PILING & CONCRETING	Noise	4	3	12	• All operatives to use ear protection when working in areas where noise levels are above acceptable limits. Ear protection to be available on site at all times, and mandatory above 85dbA.	4	1	4	All piling Operatives	Cohesion Site Foreman

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Risk Rating (RR) = Likelihood (L) x Severity (S)			

Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	CONCRETING	Bursting of concrete hose, pipelines and joints	5	3	15	• Piling foreman to inspect daily and ensure that all concrete pipe components, including securing clips, are fitted and in good condition prior to commencing pumping. • Fit whip-checks to all hanging hoses • Where practicable, avoid site plant and machinery tracking over rubber hoses.	5	1	5	All Operatives	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating			Control Measures	Residual Risk			Responsibility	Monitoring Responsibility
			S	L	RR		S	L	RR		
	CONCRETING	Blockages in concrete hoses	3	3	9	• Prior to opening a hose joint or clamp ensure pressure in the pipe is released by reverse pumping. • Locate and clear blockage within line using following procedure, • If located within the concrete line, split line at nearest joints clean out concrete re prime and reconnect. • If located within the augers, the augers to be extracted, split and cleaned, • Only trained personal involved with the operation to be in area. Eye protection must be worn at all times.	3	1	3	All Operatives	Cohesion Site Foreman
	CONCRETING	Concrete splashes to the eyes and skin	3	4	12	• Wear eye protection. • Wear gloves when handling grouts and concrete. • Wash off all spills on exposed skin as soon as possible with fresh water.	3	1	3	All Operatives	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	CONCRETING	Blowing out concrete hoses	3	5	15	• Consider the positioning of plant to minimise the risk of splashing adjacent personnel, structures, cars, huts, site cabins, pedestrians etc. • Eye protection and gloves to be worn. • Only personnel involved in the task to be in the vicinity of the operation. • A suitable container to be in position at the open end.	3	1	3	All Operatives	Cohesion Site Foreman
	STEEL FIXING	Unsecured cages	3	3	9	• Ensure solid level fixing area • Correct fixing stands • Ensure cages have enough ties to allow safe slinging	3	1	3	Cohesion Foreman	Cohesion Site Foreman
	TRIPS AND IMPALEMENT	Injuries to personnel from projecting rebar	3	3	9	• Use protective caps or mound spoil over projections.	3	1	3	Banksman	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	OPERATION OF EXCAVATORS & DUMPERS	Overturning of mobile plant	5	3	15	• All excavator movements to be under the control of banksman. • All plant to have rollover protection and working warning lights fitted. • Seat belts are to be used • Riding on plant by passenger is forbidden. • Only tow plant using the correct towing hook and connections	5	1	5	Banksman & all other operatives associated with the piling works	Cohesion Site Foreman
	CONTACT WITH PLANT	Injury through contact with machinery/plant	4	3	12	• Ensure a suitable banks person is present to manage the piling rig location and manoeuvres at all times. • Ensure all plant operators and ground operatives are aware of plant manoeuvres and keep in good contact at all times • Ensure ALL operatives involved and visiting the project wear the correct PPE, Hi viz work wear.	4	1	4	Banksman & All Operatives	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	WORKING AT HEIGHT	Falling from height	5	3	15	• Where possible all work performed at height shall be from a mobile elevated working platform (MEWP). • MEWP operators must have undertaken and successfully completed accredited training. • All persons working from a MEWP must wear a full body harness.	5	1	5	All Operatives	Cohesion Site Foreman
	WORKING AT HEIGHT	MEWP overturning	5	4	20	• The Principal Contractor must prepare a suitable working platform for the powered access platform to be operated. • The Principal Contractor's assessment of the platform must take account of subsurface voids, traps, and made ground. • Do NOT position the MEWP wheels on any drains, man hole or service inspection covers. • Operators should be "clipped on" with a safety harness.	5	1	5	Principal Contractor	Cohesion Site Foreman

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Item	Activity	Hazards/Risks Identified	Risk Rating S	L	RR	Control Measures	Residual Risk S	L	RR	Responsibility	Monitoring Responsibility
	WORKING AT HEIGHT	Contact with overhead Services	5	3	15	• The site assessment must include the location of overhead cables. • No use of powered access equipment may be authorised within 6 metres of overhead cables.	5	1	5	All Piling Operatives	Cohesion Site Foreman
	PLANT MAINTENANCE	Contact with fuels, oils, lubricants and greases	2	3	6	• Follow COSHH guidance. • Tool box talks to be carried out to highlight risk. • Avoid prolonged exposure or immersion. • Wash off all spills on exposed skin as soon as possible.	2	1	2	All Piling Operatives	Cohesion Site Foreman
	PLANT MAINTENANCE	Access to carry out maintenance/repair	5	3	15	• Follow plant manuals • Use fitted ladders, step plates & platforms, to gain access above ground.	5	1	5	All Piling Operatives	Cohesion Site Foreman

Appendix F Environmental Receptors

The Contaminated Land Statutory Guidance has a four category system that considers harm to human health, controlled waters, flora and fauna, property, livestock and crops. The Categories are broadly defined as follows:

1 Contaminated Land – similar to land where it is known that significant harm has been caused or significant harm is being caused

2 Contaminated Land – no significant harm being caused but there is a significant possibility for significant harm to be caused in the future

3 Not Contaminated Land – there may be harm being caused but no significant possibility for significant harm to be caused in the future

4 Not Contaminated Land – no pollutant linkage, normal levels of contaminants and no significant harm being caused and no significant possibility for significant harm to be caused in the future.

Table C.1: Significant pollution to controlled waters

Pollution of controlled waters
Under Section 78A(9) of Part 2A the term “pollution of controlled waters means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term “controlled waters” in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that “ground waters” does not include water contained in underground strata but above the saturation zones. (Paragraph 4.36)
Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment. (Paragraph 4.37)
Significant pollution of controlled waters
Paragraph 4.38 states that “The following types of pollution should be considered to constitute significant pollution of controlled waters:
(a) Pollution equivalent to “environmental damage” to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations.
(b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use.
(c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway.
(d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)5)”.
Paragraph 4.39 states that “In some circumstances, the local authority may consider that the following types of pollution may constitute significant pollution: (a) significant concentrations6 of hazardous substances or non-hazardous pollutants in groundwater; or (b) significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water; at an appropriate, risk based compliance point. The local authority should only conclude that pollution is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 (of the Contaminated Land Statutory Guidance). This would normally mean that the authority should conclude that

less serious forms of pollution are not significant. In such cases the authority should consult the Environment Agency".

The following types of circumstance should not be considered to be contaminated land on water pollution grounds:

(a) The fact that substances are merely entering water and none of the conditions for considering that significant pollution is being caused set out in paragraphs 4.38 and 4.39 above are being met.

(b) The fact that land is causing a discharge that is not discernible at a location immediately downstream or down-gradient of the land (when compared to upstream or up-gradient concentrations).

(c) Substances entering water in compliance with a discharge authorised under the Environmental Permitting Regulations.

Significant pollution of controlled waters is being caused

In deciding whether significant pollution of controlled waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes ongoing pollution. For these purposes, the local authority should:

(a) Regard substances as having entered controlled waters where they are dissolved or suspended in those waters, or (if they are immiscible with water) they have direct contact with those waters on or beneath the surface of the water.

(b) Take the term "continuing to enter" to mean any measurable entry of the substance(s) into controlled waters additional to any which has already occurred.

(c) Take the term "likely to do so again" to mean more likely than not to occur again.

Land should not be determined as contaminated land on grounds that significant pollution of controlled waters is being caused where: (a) the relevant substance(s) are already present in controlled waters; (b) entry into controlled waters of the substance(s) from land has ceased; and (c) it is not likely that further entry will take place.

Significant Possibility of Significant Pollution of Controlled Waters

In deciding whether or not a significant possibility of significant pollution of controlled waters exists, the local authority should first understand the possibility of significant pollution of controlled waters posed by the land, and the levels of certainty/uncertainty attached to that understanding, before it goes on to decide whether or not that possibility is significant. The term "possibility of significant pollution of controlled waters" means the estimated likelihood that significant pollution of controlled waters might occur. In assessing the possibility of significant pollution of controlled waters from land, the local authority should act in accordance with the advice on risk assessment in Section 3 and the guidance in this sub-section.

In deciding whether the possibility of significant pollution of controlled waters is significant the local authority should bear in mind that Part 2A makes the decision a positive legal test. In other words, for particular land to meet the test the authority needs reasonably to believe that there is a significant possibility of such pollution, rather than to demonstrate that there is not.

Before making its decision on whether a given possibility of significant pollution of controlled waters is significant, the local authority should consider:

(a) The estimated likelihood that the potential significant pollution of controlled waters would become manifest; the strength of evidence underlying the estimate; and the level of uncertainty underlying the estimate.

(b) The estimated impact of the potential significant pollution if it did occur. This should include consideration of whether the pollution would be likely to cause a breach of European water legislation, or make a major contribution to such a breach.

(c) The estimated timescale over which the significant pollution might become manifest.

(d) The authority's initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would be likely to bring;

and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action.

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

Table C.2: Significant harm to human health, ecological systems and property

Relevant types of receptor	Significant harm	Significant possibility of significant harm
Human beings	The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (eg cancers); other diseases likely to have serious impacts on health; serious injury; birth defects; and impairment of reproductive functions. Other health effects may be considered by the local authority to constitute significant harm. For example, a wide range of conditions may or may not constitute significant harm (alone or in combination) including: physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. In deciding whether or not a particular form of harm is significant harm, the local authority should consider the seriousness of the harm in question: including the impact on the health, and quality of life, of any person suffering the harm; and the scale of the harm. The authority should only conclude that harm is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 of the Contaminated Land Statutory Guidance.	The risk posed by one or more relevant contaminant linkage(s) relating to the land comprises: (a) The estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question. (b) The estimated impact if the significant harm did occur – i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it. In estimating the likelihood that a specific form of significant harm might occur the local authority should, among other things, consider: (a) The estimated probability that the significant harm might occur: (i) if the land continues to be used as it is currently being used; and (ii) where relevant, if the land were to be used in a different way (or ways) in the future having regard to the guidance on “current use” in Section 3 of the Contaminated Land Statutory Guidance. (b) The strength of evidence underlying the risk estimate. It should also consider the key assumptions on which the estimate of likelihood is based, and the level of uncertainty underlying the estimate.
Any ecological system, or living organism forming part of such a system, within a location which is: • a site of special scientific interest (under section 28 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Part 4	The following types of harm should be considered to be significant harm: • harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the	Conditions would exist for considering that a significant possibility of significant harm exists to a relevant ecological receptor where the local authority considers that:

Relevant types of receptor	Significant harm	Significant possibility of significant harm
of the Natural Environment and Rural Communitites Act 2006 (as amended)); • a national nature reserve (under Section 35 of the WCA 1981 (as amended)); • a marine nature reserve (under Section 36 of the WCA 1981 (as amended)); • an area of special protection for birds (under Section 3 of the WCA 1981 (as amended)); • a "European site" within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010 (as amended); • any habitat or site afforded policy protection under Section 11 of The National Planning Policy Framework (NPPF) on conserving and enhancing the natural environment (i.e. possible Special Areas of Conservation, potential Special Protection Areas and listed or proposed Ramsar sites); or • any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949.	ecological system within any substantial part of that location; or • harm which significantly affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. In the case of European sites, harm should also be considered to be significant harm if it endangers the favourable conservation status of natural habitats at such locations or species typically found there. In deciding what constitutes such harm, the local authority should have regard to the advice of Natural England and to the requirements of the Conservation of Habitats and Species Regulations 2010 (as amended).	• significant harm of that description is more likely than not to result from the contaminant linkage in question; or • there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. Any assessment made for these purposes should take into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.
Property in the form of: • crops, including timber • produce grown domestically, or on allotments, for consumption • livestock • other owned or domesticated animals; • wild animals which are the subject of shooting or fishing rights.	For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark	Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question, taking into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.

Relevant types of receptor	Significant harm	Significant possibility of significant harm
	for what constitutes a substantial diminution or loss. In the Guidance states that this description of significant harm is referred to as an “animal or crop effect”.	
Property in the form of buildings. For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables.	Structural failure, substantial damage or substantial interference with any right of occupation. The local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended. In the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled. The Guidance states that this description of significant harm is referred to as a 'building effect'.	Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument the foreseeable future), taking into account relevant information for that type of contaminant linkage.

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

UK and Ireland Office Locations

