BURO HAPPOLD

2&3 Angel Square & Marketing Suite

Ground Engineering Summary Report

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Revision P03

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1 Executive Summary

Buro Happold has been appointed by MEPC to undertake site investigation works for the proposed development of two new build office developments on 2&3 Angel Square within the NOMA Masterplan, Manchester and the new build temporary NOMA Marketing Suite (NMS). A site specific ground investigation (GI) was undertaken by Structural Soils Limited (herein referred to as SSL) between the 19th of July and 3rd of August 2021, under the supervision of Buro Happold (BH) and is herein referred to as the SSL 2021 GI. The ground conditions encountered comprise varying depths of Made Ground which is underlain by superficial deposits (very dense sand, and gravel and firm to stiff gravelly clay), underlain by very weak to weak sandstone bedrock (Chester Formation).

A number of obstructions were recorded within the Made Ground during the SSL 2021 GI which are likely to be associated with relic substructure from historic buildings located on site, most notably a 3.2 m deep chamber in TP110a. This chamber and any other insitu obstructions will require removal prior to installation of the new foundations.

Based on the monitoring data obtained to date, a deeper groundwater regime is recorded within the sandstone bedrock (Chester Formation). Perched groundwater was also recorded locally within the Made Ground. Although some localised shallow groundwater was recorded onsite, it is not anticipated that groundwater ingress will cause significant problems for the envisaged excavation works in the temporary case. Any perched water seepages which may be encountered during excavation construction works are likely to be relatively minor and could be controlled by localised sump pumping methods. It should be noted, that should more significant water ingress be encountered, then more substantial water control measures may be required.

6 No. rounds of ground gas monitoring have been undertaken as part of the SSGI. The data has classified the site as Characteristic Situation 1 (CS1) so far.

A series of chemical tests have been undertaken on the material encountered during the SSL 2021 GI. 2 No. of the 10 No. soil samples tested record determinands exceeding the relevant 'commercial threshold' criteria, namely for Lead (TP104 at 0.50 m BGL and TP111 at 1.80 m BGL. Asbestos fibres were recorded within 1 No. of the 14 No. samples tested in the Made Ground (TP108 at 0.60 m BGL). Asbestos quantification tests were undertaken and the results recorded 0.003% by mass. In accordance with CAR-SOIL[1] Watch Point 12 the concentrations of asbestos recorded is 'low'. The remediation strategy is provided in Section 4.8.

10 No. chemical samples were also tested for the Waste Acceptance Criteria. 7 No. meet the non-hazardous waste criteria for inert landfill, however 3 No. soil samples meet the hazardous criteria.

The existing documentation in relation to unexploded ordnance (UXO) advises that the site is 'medium risk' from UXO. UXO supervision was provided during the SSL 2021 GI, and although no evidence of UXO was found during the investigation at the locations of the exploratory boreholes, window samples and trial pits, it is considered that UXO mitigation is required during ground investigation and construction phases of work.

The proposed foundation solution for 2&3 Angel Square is envisaged to be bored cast in-situ piled foundations, due to building height, envisaged column loads along with a vertical embedded retaining wall comprising a secant piled wall. The foundations for NMS are proposed to be a shallow solution comprising strip footings or a raft, based on a bearing capacity of 60 KPa in the natural clay or 50 KPa in the MG. The formation should be tested insitu (plate bearing test).

[1] CAR-SOIL Control of Asbestos Regulations (2012), Interpretation for Managing and working with asbestos in soil and construction demolition materials – Industry Guidance. Published by Contaminated Land: Applications if Real Environments (CL;AIRE).

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2 Introduction and The Site

Buro Happold has been appointed by MEPC to undertake site investigation works for the proposed development of two new build office developments on 2&3 Angel Square within the NOMA Masterplan, Manchester and the new build temporary NOMA Marketing Suite (NMS). Please note, for the purposes of this report, 2&3 Angel Square & NMS have been evaluated as one proposed development site herein referred to as 'the Site'. This document provides a summary of the ground investigation works undertaken by SSL and includes an updated risk assessment in relation to planning condition 8a for NMS.

The Site is located to the north of Manchester City Centre, approximately 220 m east of Manchester Victoria Railway Station. It is also in the immediate vicinity of the existing Co-operative Insurance Society (CIS) Tower which lies just beyond the corner of the western boundary. The site area is currently occupied by public car parking areas, managed by RCP Parking, with the main access from Angel Street. The immediate surrounding area comprises urban development including residential, warehouses, offices and manufacturing facilities. A site location plan is included as Figure 1.

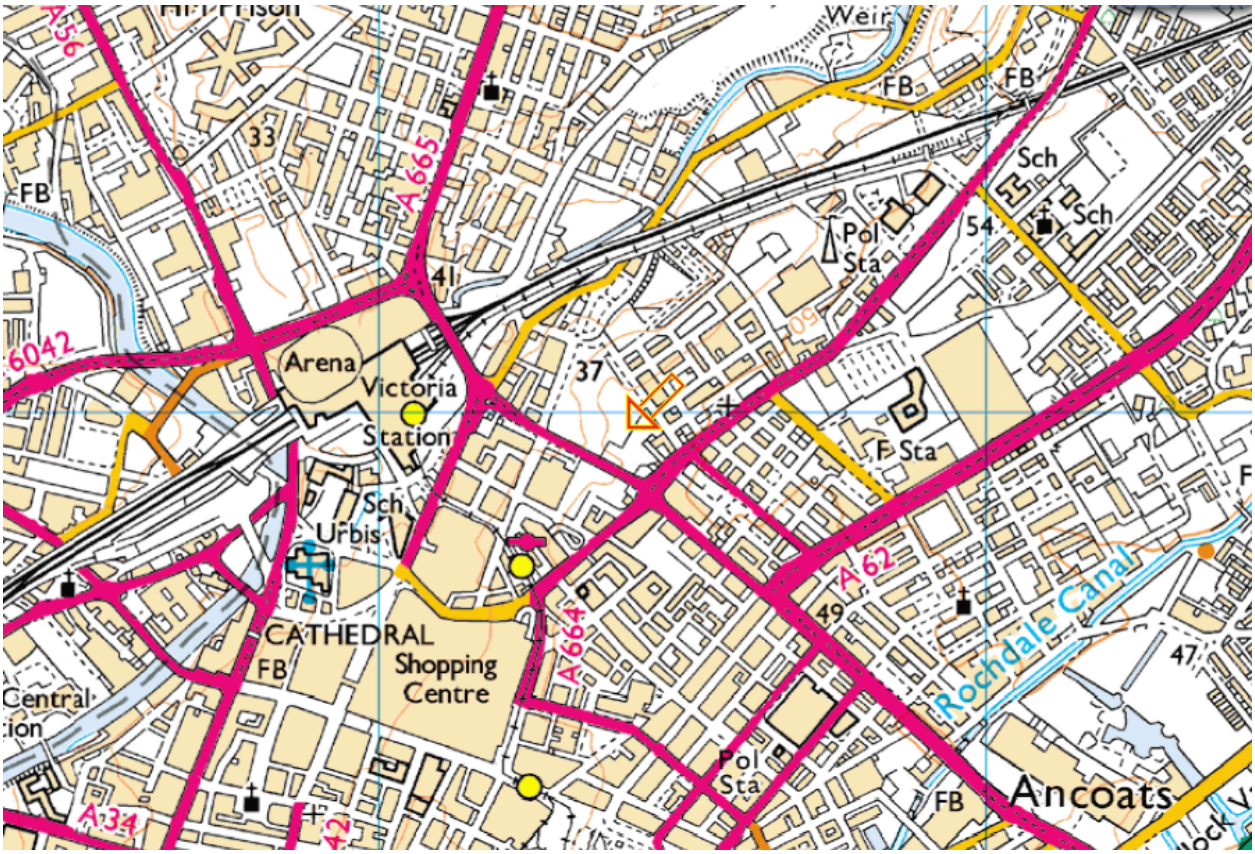


Figure 2—1 Site Location Plan

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The Proposed Development is for offices (Use Class B1a), with ground floor retail and commercial units, external terraces at upper levels, car parking and cycle facilities. The Proposed Development will comprise two buildings, one of lower and upper ground plus 10 storeys (2 Angel Square) and one of lower and upper ground plus 11 storeys (3 Angel Square) and will also include a comprehensive public realm scheme with hard and soft landscaping, car parking, and highways and other associated works. In advance of works staring on 2 & 3 Angel Square, the NMS is proposed to be erected on site as a temporary building in the southwestern corner of the Site and will consist of a single storey building with associated car parking and public realm (Figure 1—2 refers).



Figure 2—2 NMS layout

The data sources reviewed can be summarised as follows:

- Wessex Archaeology Report entitled 'Arkwright's Mill, NCP Car Park, Miller Street, Manchester' (Report No. 59471.01), dated April 2006, on behalf of Videotext Communications Limited;
- Gifford Report entitled 'Land off Miller Street, Manchester: An Archaeological Desk-Based Assessment' (Report No. 14039.R01), dated May 2007, on behalf of The Cooperative Group Limited;
- EOD Contracts Limited Report Entitled 'Explosive Ordnance Desk Top Study, Miller Street Manchester for the Co-operative Group' (Ref: No: ECL/09/10360/DTS/MillerStManchester/Rev2), dated March 2009, on behalf of The Co-operative Group Limited;
- Buro Happold Report entitled 'Ground Engineering Desk Study Report – The Co-Operative Group HQ Building, Manchester' (Ref: 023842), dated July 2009, on behalf of The Co-operative Group Limited;
- Structural Soils Report entitled 'Report on Ground Investigation at the co-operative Head Office, Manchester' (ref: 761072), dated September 2009, on behalf of The Co-operative Group Limited (ref: SSL 2009 GI);

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- Buro Happold Report entitled 'Ground Engineering Interpretative Report – The Co-Operative Group Head Office, Manchester' (Ref: 023842), dated October 2009, on behalf of The Co-operative Group Limited;
- Buro Happold Report entitled 'Ground Engineering Desk Study Report – NOMA Plot L, Manchester' (Ref: 032922), dated November 2013, on behalf of The Co-operative Group Limited;
- Buro Happold Report entitled 'Ground Engineering Interpretative Report – NOMA Plot L, Manchester' (Ref: 023922), dated November 2013, on behalf of The Co-operative Group Limited;
- Structural Soils Report entitled 'Factual Report on Ground Investigation at NOMA Plot L, Manchester' (ref: 762850), dated January 2014, on behalf of The Co-operative Group Limited (ref: SSL 2013 GI);
- Oxford Archaeology North Report entitled 'NOMA Regeneration, Miller Street, Manchester' (Report No. L10460), dated February 2013, on behalf of The Co-operative Group Limited;
- Oxford Archaeology North Report entitled 'NOMA Plot L, Miller Street, Manchester – Archaeological Evaluation' (Report No. L10761), dated July 2014, on behalf of NOMA Plot L Limited;
- Oxford Archaeology North Report entitled 'NOMA Plot L, Angel Square, Miller Street, Manchester – Archaeological Desk-based Assessment' (Report No. L10812), dated December 2014, on behalf of Moda Living;
- Oxford Archaeology North Report entitled 'NOMA Plot M, Miller Street, Manchester – Archaeological Desk-based Assessment' (Report No. L10755), dated June 2014, on behalf of NOMA;
- Oxford Archaeology North Report entitled 'Arkwright's Shudehill Mill, Miller Street, Manchester – Archaeological Assessment' (Report No. L10772), dated September 2014, on behalf of NOMA;
- Oxford Archaeology North Report entitled 'Shudehill Mill, Miller Street, Manchester – Archaeological Excavation, Written Scheme of Investigation', dated January 2015, on behalf of NOMA & Moda Living;
- Sanctus Report entitled 'Angel Square – Site Investigation Report' (Report No. S1933-001), dated May 2015, on behalf of NOMA;
- Sanctus Limited report entitled 'Contract Completion Report, Angel Square, Manchester' (Report No. S1918), dated June 2015, on behalf of NOMA;
- Structural Soils Limited Report entitled 'Factual Report on Ground Investigation – 2&3 Angel Square, Manchester (Ref: 763315 Rev 2 Final), dated July 2015, prepared on behalf of the Co-operative Group Limited (ref: SSL 2015 GI);
- Sanctus testing – 6 No. samples SS1 - SS4, EMB1 - EMB2: plan and chemical results only, dated September/October 2015, on behalf of Turner & Townsend Limited;
- W.Maher testing - 6 No. samples Stockpile 1 – Stockpile 4, Embankment 1 – Embankment 2: plan and chemical results only, dated October/November 2015, on behalf of Turner & Townsend Limited;
- Churchill Enviro Limited report entitled 'Validation Report For Works Carried Out By W Maher and Sons At Angel Gardens, Manchester', dated March 2016, on behalf of Turner & Townsend;
- RSK report entitled 'NOMA Angel Gardens, Manchester – Geo-environmental site assessment' (Report No. 322162), dated January 2016, on behalf of Moda Living (Angel Gardens) Limited;

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- Churchill Enviro Limited report entitled 'Validation Report For Remediation Work Carried Out as Part of the Enabling Works Contract by W Maher and Sons at Angel Gardens, Manchester', dated October 2016, on behalf of Turner & Townsend;
- Buro Happold Report entitled 'Ground Engineering Desk Study Report – NOMA, 2&3 Angel Square' (Ref: 043434), dated September 2019, on behalf of NOMA (GP) Limited;
- Salford Archaeology report entitled 'NOMA Plots 2&3, Angel Street, Manchester – Archaeological Evaluation Report' dated June 2021, on behalf of NOMA GP Limited;
- The British Geological Survey (BGS) - England & Wales Sheet 85 'Manchester'.
- The Coal Authority;
- Published technical reports;
- Historical literature;
- Documents found during internet searches; and
- Any information provided by the Client i.e. previous desk study or ground investigation / utilities information.

All the aforementioned reports/information should be read in conjunction with this report.

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3 Ground Investigation

3.1 General

Information from the BGS along with historic GI data available from the surrounding area was initially reviewed to generally establish the envisaged ground conditions across the development area. Two site specific GI's have been undertaken by SSL, both under the supervision of Buro Happold.

The SSL 2015 GI was undertaken during January 2015 and comprised 13 No. machine excavated trial pits (TP1 - TP4, TP4A, TP5 – TP10, TP10A and TP11) across the Site and its surrounds, along with associated chemical testing including asbestos identification and quantification. Groundwater and ground gas monitoring was also carried out in historical borehole BHL01 on the Angel Gardens site. All other historical borehole installations could not be found.

The second site specific ground investigation was undertaken by SSL between the 19th of July and the 3rd of August 2021, (herein referred to as the SSL 2021 GI). It comprised 4 No. boreholes (BH101-104), 5 No. window samples (WS101-105) and 12 No. trial pits (TP101-112 and 110a) across the Site. The boreholes were drilled to depths ranging between 25.00 and 31.00 m BGL using cable percussive drilling with rotary drilling follow to obtain rock core. Sampling, geotechnical and geo-environmental testing (including asbestos identification and quantification) and groundwater and ground gas monitoring was also undertaken as part of the SSL 2021 GI.

Please note, during the archaeological excavation of Arkwrights Mill, the presence of asbestos within the Made Ground was recorded. A strategy for dealing with asbestos contamination within the footprint of Arkwrights Mill was completed during May 2015 comprising the removal of all Asbestos Containing Material (ACM) off site (refer to Sanctus Report[2]).

The following sections of this document outline the findings of the SSL 2015/2021 GI's, and assess the ground conditions and associated risk for the proposed developments in relation to human health. The updated risk assessment is contained within Appendix B.

The SSL 2021 Factual Report on Ground Investigation[3] should be read in conjunction with this report.

3.2 Material Type and Distribution

The ground conditions have been assessed on the basis of the available information. The general sequence of strata encountered based on available BGS borehole logs in the surrounding area and that of the ground conditions encountered during the SSL 2015/2021 GI's are summarized in **Table 1.**

[2] Sanctus Report on behalf of the client, NOMA, entitled "Contract Completion Report, Angel Square, Manchester, ref S1918, Dated June 2015.
[3] Structural Soils Limited, Report on Ground Investigation, 2 & 3 Angel Square and NOMA Marketing Suite, Manchester (ref:765325-1(2)) Revision 2, 3rd November 2021.

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Table 1: Conceptual Ground Model based on SSL 2015 / 2021 GI data.

Depth to Top of Strata (m BGL)	Typical Thickness (m)	Generalised Description
0.00	0.15 – 5.00	Black brown slightly clayey slightly sandy angular to subangular GRAVEL of brick and ash with high cobble and medium boulder content. Gravel comprises various materials including sandstone, mudstone, limestone, glass, tarmac, coal, slag, concrete, slate, clinker, brick, rare granite and ceramic fragments. AND Black sandy fine to coarse GRAVEL in clayey matrix with pottery and snail shells (1.80 - 2.20 m BGL in TP5 only – former reservoir) [MADE GROUND]
0.35 – 4.65	>0.20 - 14.80	Firm to very stiff brown/red brown slightly sandy silty gravelly CLAY. Gravel is fine to coarse angular to rounded of sandstone & mudstone. AND Orange brown, slightly clayey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, subangular to rounded of quartzite, limestone, sandstone and ironstone. Occasional layers of brown, sandy, gravel. [GLACIAL TILL / GLACIOFLUVIAL]
11.10 – 15.50	>10.00 - >17.00 (thickness not proven)	Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to course of quartzite. AND Very weak to weak, red/brown, medium to coarse grained sandstone with occasional layers of marl. [CHESTER FORMATION]

Note: During the SSL 2015 GI groundwater was recorded in TP1, TP5 and TP7 as 'slight seepage' at 1.10, 1.80 and 0.50 m BGL (44.56, 45.57 and 44.24 m AOD respectively).

During the SSL 2021 GI groundwater was recorded in: BH101 at 11.70 m bgl, BH103 at 5.70 m bgl, and BH104 at 5.20 m bgl. No groundwater strikes were recorded within the window samples or trial pits during the SSL 2021 GI.

The ground conditions comprise varying depths of Made Ground which is underlain by superficial deposits (dense to very dense sand, gravel and firm to very stiff clay), underlain by completely weathered sandstone bedrock, in turn underlain by very weak to weak sandstone bedrock (Chester Formation). Relevant exploratory hole logs and location plans are included in Appendix A. It is considered that the seepages encountered are localised and variable perched groundwater may be encountered within the Made Ground and superficial deposits.

3.3 In Situ Testing

In-situ testing undertaken during the SSL 2021 GI included 65 No. standard penetrations tests (SPTs). The results are summarized in the subsequent sections of this report. SPTs were undertaken in both the 5 No. Window Samples and 4 No. boreholes. The results are presented in the Structural Soils Factual Report on Ground Investigation and are summarized in the following sections.

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3.3.1 Made Ground

A total of 9 No. SPTs are available for Made Ground and can be summarized as follows:

- Minimum Value: N = 7 – recorded in WS102 at 1.00 m bgl
- Maximum Value: N = 39 – recorded in WS105 at 2.00 m bgl

The interpolated material strength assessment based on the SPT results indicates the Made Ground (predominantly granular) to range typically between Loose to Medium Dense.

3.3.2 Superficial Deposits

3.3.2.1 Cohesive Glacial Till

A total of 15 No. SPTs are available in the cohesive Glacial Till superficial deposits and can be summarized as follows:

- Minimum Value: N = 12 – recorded in WS104 at 1.00 and 2.00 m bgl
- Maximum Value: N = 200* - recorded in WS102 at 4.80 m bgl
- Typical Values: N = 12 - 200*

The interpolated material strength assessment based on the SPT results indicates the Glacial Till Deposits to have undrained shear strengths ranging between 54 and 100 kPa. It should be noted that 5 No. SPT results undertaken in the Glacial Till reached refusal indicating a material strength greater than that for which the test was originally designed.

3.3.2.2 Granular Glaciofluvial Deposits

A total of 22 No. SPTs are available in the granular glaciofluvial superficial deposits and can be summarized as follows:

- Minimum Value: N = 12 – recorded in BH103 at 3.50 m bgl (39.50 m AOD)
- Maximum Value: N = 950* - recorded in WS102 at 4.50 m bgl (38.50 AOD).
- Typical Values: N = 12 - 400*

The interpolated material strength assessment based on the SPT results indicates the Glaciofluvial Deposits to be Medium Dense to Very Dense. It should be noted that 17 No. SPT results undertaken in the Glaciofluvial Deposits reached refusal indicating a material strength greater than that for which the test was originally designed.

**Extrapolated 'N' value where full penetration was not achieved. Extrapolated 'N' values where SPT reached refusal indicate a material strength that is greater than that of which the test was designed.*

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3.3.3 Weathered Sandstone/Sandstone

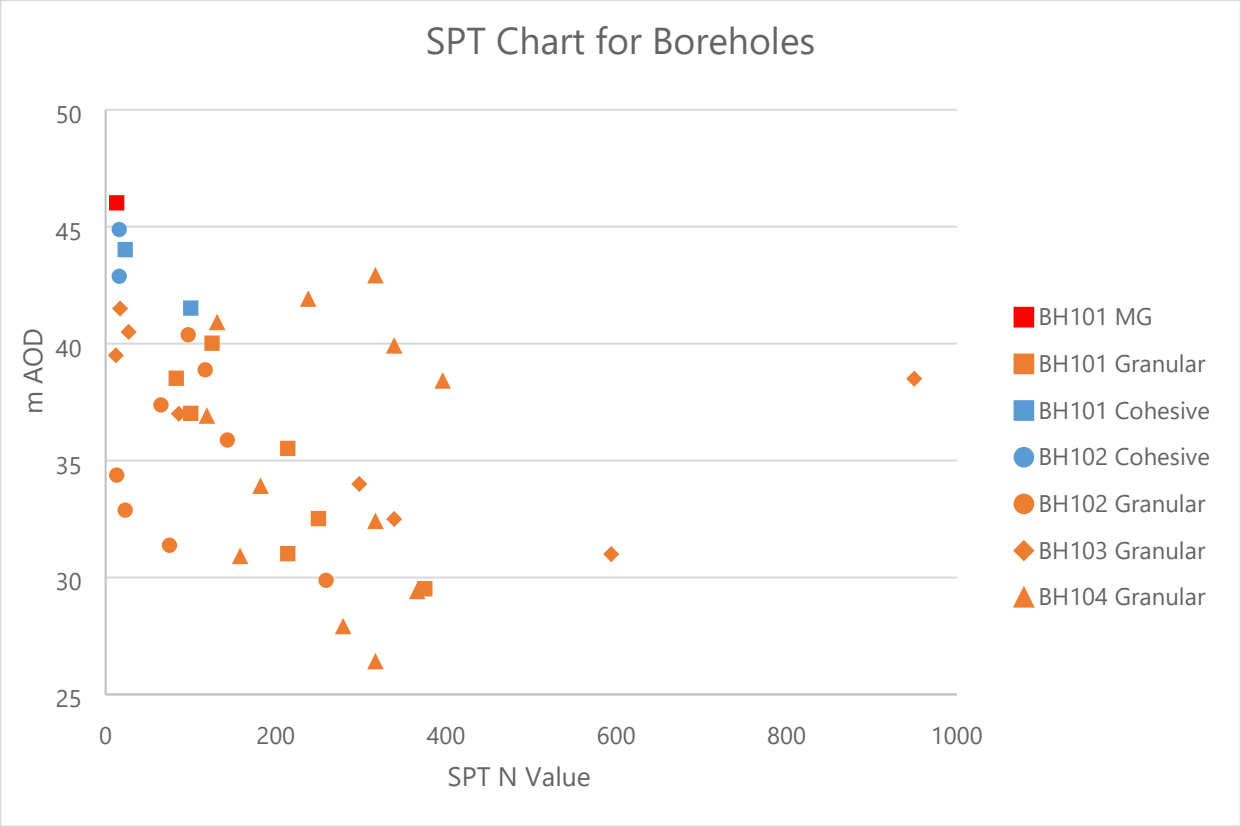
A total of 17 No. SPTs are available in the weathered sandstone/sandstone deposits and can be summarized as follows:

- Minimum Value: N = 75* – recorded in BH102 at 15.50 m bgl (31.38 m AOD)
- Maximum Value: N = 594* - recorded in BH02 at 22.50 m bgl (21.90 m AOD).
- Typical Values: N 75*-594*

It should be noted that SPTs were requested by BuroHappold in the sandstone bedrock where 2 No. consecutive core runs achieved <95% core recovery.

The interpolated material strength assessment based on the SPT results indicates the Weathered sandstone/ sandstone to be Very Dense. It should be noted that all 17 No. SPT results undertaken in the exploratory holes reached refusal indicating a material strength greater than that for which the test was originally designed.

Table 2: SPT Results for SSL 2021 GI (2021) Boreholes



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3.4 Rock Strength

A total of 31 No. point load tests (PLT) were undertaken on rock core samples obtained during the ground investigation. Rock strength varied from 0.24 MPa (BH101 at 18 m bgl (29.52 m AOD)) to 20 MPa (BH104 at 28 m bgl (16.20 m AOD)). The PLT indicate that the sandstone is very weak (UCS between 1-5 MPa) between 30.00 and 17.00 m AOD (~13.00 to 29.00 m bgl) and becomes weak (UCS between 1-25 m MPa) below 17.00 m AOD (>24.00 m bgl). This also correlates to the borehole records that frequently record non-intact rock core recovery.

3.5 Groundwater

3.5.1 Historical Groundwater Data

A total of 12 No. groundwater monitoring visits were undertaken as part of the SSL 2009 GI for 1 Angel Square and the SSL 2013 GI for Angel Gardens. A further 3 No. visits were carried out to monitor any historical installations left in-situ, namely BHL01 (SSL 2013 GI).

The majority of the post fieldwork groundwater monitoring results for the Chester Formation show a typical range of between 25.49 m AOD and 26.20 m AOD (~20.00 to 23.30 m bgl).

3.5.2 SSL 2021 Groundwater Data

As part of the SSL 2021 GI groundwater and gas monitoring wells were installed in the 4 No. boreholes and 5 No. window samples. Refer to Table 3 for details of the installations.

Table 3: Summary of groundwater monitoring installations

Borehole Identification	Installation Type	Response Zone (m BGL)	Stratum
BH101	19 mm piezometer	17.00-28.00 (Tip at 25)	sandstone
BH101	50 mm standpipe	1.00-2.00	Made Ground
BH102	19 mm piezometer	20.00-28.00 (Tip at 24)	Sandstone
BH103	19 mm piezometer	16.00-25.00 (Tip at	sandstone
BH103	50 mm standpipe	2.00-4.00	Made Ground
BH104	19 mm piezometer	15.00-21.00	sandstone
WS101	50 mm standpipe	1.00-2.00	Made Ground
WS102	50 mm standpipe	0.50-1.00	Made Ground
WS103	50 mm standpipe	0.25-1.00	Made Ground
WS104	50 mm standpipe	0.25-1.00	Made Ground
WS105	50 mm standpipe	1.00-4.00	Made Ground

All (6 No.) post-fieldwork monitoring visits have been undertaken, between the 13th of August 2021 and the 22nd of October 2021. The SSL 2021 GI groundwater data indicates static water level (SWL) between ~30.08 m AOD and 24.97 m AOD (15.69 to 21.92 m bgl) within the sandstone bedrock (Chester Formation). Localised perched groundwater is also recorded within the Made Ground/superficial deposits (~0.50 to 3.95 m BGL). It is worthy of note that there were no groundwater strikes within the trial pits or window samples during the SSL 2021 GI.

The hydraulic regime within the bedrock is considered to be controlled by the nature of the cementation and fracturing of the rock mass. It is also important to note that the Chester Formation is classified as a Principal Aquifer

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by the Environment Agency, therefore consideration for the prevention of the migration of contamination (if any) and protection of the Principal Aquifer may be required.

3.6 Ground Gas

3.6.1 SSL 2021 Gas Monitoring Data

As part of the SSL 2021 GI, 11 No. ground gas monitoring wells were installed for monitoring. The wells are summarised below in Table 4.

Table 4:Summary of ground gas monitoring installations

Borehole Identification	Installation Type	Response Zone (m BGL)	Stratum
BH101	50 mm standpipe	1.00-2.00	Made Ground
BH101	19 mm piezometer	17.00-29.00	Sandstone
BH102	19 mm piezometer	23.70-24.00	Sandstone
BH103	50 mm standpipe	2.00-4.00	Made Ground
BH103	19 mm piezometer	15.60-25.00	Sandstone
BH104	19 mm piezometer	15.60-21.10	Sandstone
WS101	50 mm standpipe	1.00-4.00	Made Ground
WS102	50 mm standpipe	0.25-1.00	Made Ground
WS103	50 mm standpipe	0.25-1.00	Made Ground
WS104	50 mm standpipe	0.25-1.00	Made Ground
WS105	50 mm standpipe	1.00-4.00	Made Ground

All post-fieldwork monitoring visits have been undertaken between on the 13th of August 2021 and the 22nd of October 2021. It should be noted that in a number of occasions it was not possible to access the monitoring wells due to cars being parked over the exploratory position (refer to Appendix C), however, this is not considered to have a significant influence over the final classification of characteristic situation. The ground gas concentrations and flow rates obtained from the installations to date have been assessed against the classification scheme presented in CIRIA C665 (Assessing risks posed by hazardous ground gas to buildings (2007)). A short summary is provided below;

- Gas flow rates recorded to date suggest very low flow ranging between -1.5 and 1.0 l/hr.
- Oxygen (O_2) levels generally range between 19.0 and 21.0 % in all boreholes. A relatively low oxygen concentration of 9.8 % was recorded in WS102 (response zone 0.00-1.00 m bgl in Made Ground) on the 6th October 2021 and 13.0% in WS105 (response zone 0.00-4.00) on the 13th August 2021.
- Carbon Dioxide (CO_2) levels generally range between 0.1 and 1.0% across the site. An elevated concentration of 5.0 % was recorded in WS105 (in Made Ground) on the first monitoring visit (13th August 2021). It is envisaged that this elevated CO_2 is related to a reducing environment causing nitrogen to replace the O_2 & CO_2 to be elevated.
- Methane (CH_4) levels generally ranged between 0.0 and 0.1% across all monitoring wells. Slightly elevated Methane (CH_4) concentrations were noted in BH102 (Sandstone) ranging between 1.3% and 1.4% on the 22nd of October 2021 and 6th of October 2021. It is noted that no identifiable sources of methane were recorded in the exploratory logs during the SSL 2021 GI. It is also considered that the pathway between the Sandstone (bedrock) and the proposed building is broken by the superficial glacial till / glaciofluvial deposits.

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At present the ground gas results classify the ground gas characteristic situation to typically be CS1. Given the ground gas monitoring results, it is considered that ground gas protection designed in accordance with the BS 8485 to provide a suitable level of protection to end users is required.

3.6.2 SSL 2021 Bulk Gas Suite Analysis

During the final monitoring visit undertaken on 22nd October as part of the SSL 2021 GI, 1 No. bulk gas sample was collected from WS102 for bulk gas suite laboratory analysis. The sample was collected due to the reduced Oxygen (O_2) concentration recorded on numerous visits (visit 1,2,5 & 6). The bulk gas analysis from the 22nd of October is as below:

- Carbon Dioxide (CO_2 %) – 0.14;
- Carbon Monoxide (CO%) - <0.05;
- Hydrogen (H_2%) – <0.5;
- Methane (CH_4%) - <0.05;
- Methane (CH_4 ppmV) - <5;
- Nitrogen (N_2%) – 82.9; and
- Oxygen (O_2%) – 17.

3.6.3 Solution Choice and Detailed Design

The purpose of this section is to identify the building classification and the appropriate ground gas protection measures based on the characteristic situation on-site. The BS 8485:2015+A1:2019[4] "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings" has been consulted and is referred to in this section of the report in order to achieve the above.

3.6.4 Building Type Classification

The proposed development, 2 & 3 Angel Square, comprises two commercial buildings, one of lower and upper ground plus 10 storeys (2 Angel Square) and one of lower and upper ground plus 11 storeys (3 Angel Square). NMS comprises a temporary single storey smaller commercial building located in the southwestern corner of the Site. It is therefore considered that the relevant building type classification with reference to BS 8485:2015+A1:2019 is "Type B Building" for both. A description of Type B buildings in the BS 8485:2015+A1:2019 is below:

Type B building: *private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.*

3.6.5 Minimum Gas Protection Score

The post-fieldwork ground gas monitoring results, as discussed in Section 1, identified a maximum Characteristic Situation 2 (CS2) (1 No. location from a flooded well in the sanstone) and a typical Characteristic Situation CS1 for the proposed site. It should be noted that the monitoring well recording a CS2 was a deep flooded well located in the sandstone and that the pathway between the sandstone and the proposed building is considered to be broken by the

[4] BS8485:2015+A1:2019, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, January 2019.

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overlying superficial glacial till and glaciofluvial deposits. In addition, the maximum Characteristic Situation recorded in the Made Ground material (the most likely source of any ground gas) is CS1. Considering the aforementioned it is considered that Characteristic Situation 1 (CS1) is a suitable classification for the site. In accordance with Table 4 (page 22, BS 8485:2015+A1:2019) if the Site is classified as CS1, 0 points are required and thus ground gas protection is therefore not required.

3.7 Obstructions

The Site has an extensive and rich development history (BH Desk Study[5] refers). Based on the historic data, it was envisaged that large amounts of the substructure were likely to be encountered during the GI. As anticipated, the information obtained during the SSL 2021 GI indicates that some relic substructure and infrastructure currently remains in-situ below the site and as such, a number of these are likely to cause obstructions during the installation of the new substructure. As such, in advance of the new substructure installation it is envisaged that any such areas where old and new substructure clash, then these areas of old substructure will need to be removed in advance of the new foundation installation. It is currently envisaged that such obstructions will be removable using conventional plant and equipment including the use of pneumatic breakers.

It should also be noted that during the SSL 2021 GI a ~3.2 m below ground chamber was encountered in TP110a. This is recorded on any previous surveys, therefore it is recommended that further investigation is undertaken to understand if the existing chamber / infrastructure is still in use and requires diverting, or if it is part of an abandoned system to be grubbed up/ grouted up.

3.8 Unexploded Ordnance (UXO)

The proposed developments is situated in an area identified as being at 'moderate' risk from unexploded ordnance (UXO) as detailed in the relevant Zetica UXB (Unexploded Bomb) risk map for the site[6]. A Detailed Unexploded Ordnance (UXO) Risk Assessment[7] was undertaken by 1st Line Defence on behalf of the Client, MEPC. The conclusion of the UXO Risk Assessment was that the site is 'medium risk' therefore UXO mitigation is considered to be required during ground investigation and construction phases of work.

During the SSL 2021 GI, UXO engineer supervision was provided to prove positions 'clear' of any UXO. No UXO was identified or uncovered as part of the Ground Investigation works. However, it is considered that UXO mitigation is required during any intrusive works on site (intrusive enabling works and piling).

3.9 Archaeology

The 2 & 3 Angel Square site is subject to intrusive archaeological excavation by Oxford Archaeology North which is currently ongoing. The findings from the Oxford Archaeology North investigation should be read alongside this report, once available.

[5] Buro Happold Ground Engineering Desk Study Report, NOMA, 2 & 3 Angel Square (ref: 043434), Dated 4th September 2019.
[6] Zetica, Regional Unexploded Bomb Risk Map, Site Location Map Centre 399468,651513
[7] 1st Line Defence, Detailed Unexploaded Ordnance (UXO) Risk Assessment, 2 & 3 Angel Square, Manchester, ref: DA13039-00, 16/04/2021.

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4 Geoenvironmental Summary

4.1 General

A geoenvironmental assessment of the Site has been undertaken to assess the degree of contamination present, if any, in respect of the proposed development, the health and safety of the construction work force and to allow characterization of material for the waste disposal of surplus arisings.

Soil samples have been obtained during the historical and recent site specific investigations and submitted for chemical testing as summarised in subsequent sections.

4.1.1 Historical Data

Chemical testing was carried out during the SSL 2015 GI in respect of end use, health and safety considerations in addition to waste disposal categorization as detailed below:

- 19 No. samples of Made Ground and natural material (BuroHappold General Suite – soil and leachate),
- 10 No. stockpile samples (Waste Acceptance Criteria only – soil and leachate)
- 6 No. samples of Made Ground and natural material (additional asbestos identification only)
- 3 No. samples of Made Ground (Asbestos Quantification only)

Soil Results

All Made Ground sampled recorded concentrations of all determinants below commercial thresholds with the exception of Lead at a concentration of 3750 mg/kg in TP4A at 2.00 m BGL. Please note, TP4A is not located within the confines of the proposed 2&3 Angel Square development boundary and as such is not discussed further.

All natural soils sampled recorded concentrations of all determinants below commercial thresholds.

5 No. samples recorded the presence of asbestos as detailed in Table 2 below. Please note, the Made Ground within the footprint of Arkwrights Mill (containing asbestos) has now been removed from Site and the excavation has been infilled (with 6F2 – the details of which Buro Happold are not currently aware of). Waste materials including old shoes, plastic ties and fabrics were recorded in the Made Ground in TP10A between 0.50 – 2.00 m BGL. This material is proposed to be segregated and removed during the enabling works for 2&3 Angel Square and the NMS. Section 4.8.1 details the methodology.

Exploratory Hole	Sample Depth (m BGL)	Asbestos Type	Quantification (%)	Comments
TP1	0.30	Chrysotile fibres	-	Arkwrights Mill footprint. Removed
TP2	0.30	Chrysotile fibres	-	Arkwrights Mill footprint. Removed
TP4A	2.00	Chrysotile fibres	<0.001	Located offsite
TP10A	1.00	Chrysotile fibres	<0.001	To be removed & segregated if encountered. Material can also be left insitu and capped appropriately (no change from existing situation).
TP10A	2.00	Chrysotile cement	0.006	

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Leachate Results

The leachate results record a number of minor exceedances (less than an order of magnitude) of lead, barium, antimony, sulphate and fluoride. Given the extremely limited number of exceedances, the magnitude of the exceedances, the low soil concentrations recorded on the respective samples and the fact that the assessment criteria used are considered to be overly onerous for the purpose of the analysis, it is considered that leaching of such determinands to controlled water receptors is unlikely and as such no further analysis on the associated leachate concentrations is considered necessary.

Groundwater Results

A total of 2 No. groundwater samples from the Chester Formation were tested during the SSL 2015 GI. No elevated determinands were found with the exception of sulphate in BH01 which recorded of 440 mg/l - a slight exceedance of the Environment Agency Non Statutory assessment value of 400 mg/l.

1 No. groundwater sample from the Made Ground was tested during the SSL 2015 GI within TP5 at 1.80 – 2.20 m BGL – thought to represent the presence of Arkwrights Mill historical reservoir. Arsenic, Nickel, Antimony, Benzo(a)pyrene and Total Polyaromatic Hydrocarbons (PAH) were elevated with respect to the relevant assessment criteria. Please note, both the soil and leachate results from TP5 at 1.80 m BGL recorded no exceedances of any determinands, therefore, the groundwater in this area of the Site is considered to be a localized pocket of perched water which is not in hydraulic continuity with the Principal Aquifer (Chester Formation).

Based on the foregoing, no further analysis on groundwater concentrations is considered necessary as it is considered that the determinands do not pose a significant threat to controlled waters and, as such, do not require further consideration.

4.1.2 SSL 2021 GI Data

Chemical testing was carried out during the SSL 2021 GI in respect of end use, health and safety considerations in addition to waste disposal categorization as detailed below:

- 10 No. samples of Made Ground (Buro Happold General Suite – soil and leachate),
- 6 No. samples of Made Ground (additional asbestos identification only)
- 1 No. sample of Made Ground (Asbestos Quantification only)

A total of 10 No. soil chemical tests were undertaken in Made Ground. Based on the proposed development end use and in respect of contaminated land threshold criteria for the site, 'commercial' threshold criteria are considered to be most relevant. The chemical data has been screened against the C4SL and S4UL criteria for each associated threshold.

2 No. of the 10 No. samples tested recorded determinands that exceeded the relevant 'commercial' threshold for lead (2,330 mg/kg). The samples and determinands that exceeded commercial thresholds are listed below. Given the depths of the samples, is likely that this material will be removed from site during basement excavation.

- TP104 at 0.50 m BGL – Lead: 5910 mg/kg (located under 2 AS plot)
- TP111 at 1.80 mg/kg – Lead: 4300 mg/kg (located in between 3 AS and NMS)

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4.2 Asbestos Containing Material (ACM)

14 No. tests on samples within Made Ground deposits were screened for ACM. 1 No. sample recorded the presence of asbestos fibres, namely Chrysotile in TP108 at 0.60 m BGL (located under 3 AS plot). Asbestos quantification was undertaken on the sample which recorded ACM at 0.003%. In accordance with CAR-SOIL[8] Watch Point 12 the concentrations of asbestos recorded is 'low'.

In the instance that any asbestos containing material is encountered during the enabling works for NMS or 2 & 3 Angel Square, a Plan of Work, created by a suitably competent person is to be followed in order to adopt the appropriate actions to control risk and prevent harm.

4.3 Waste Acceptance Criteria

A two-tier Waste Acceptance Criteria assessment has been undertaken on a total of 10 No. soil samples as part of the SSL ground investigation and the results are summarised below.

Tier One – Hazwaste online

10 No. soil samples were tested for a suite of chemical determinands. The results of the chemical tests were input into the HazWaste online software to establish if the samples were 'Non-Hazardous' or 'Hazardous'. Based on the Tier One assessment, 7 No. soil samples tested were classified as 'Non-Hazardous' and 3 No. soil samples were classified as 'Hazardous'.

The 3 No. 'Hazardous' soil samples were classified for the following properties:

- TP102 at 0.70 m bgl – Lead (1060 mg/kg) and Zinc (1580 mg/kg - located under 2 AS plot);
- TP104 at 0.50 m bgl – Lead (5910 mg/kg - located under 2 AS plot); and
- TP111 at 1.80 m bgl – Lead (4300 mg/kg - located in between 3 AS and NMS)).

Tier Two – Waste Acceptance Critera

4 No. soil samples were tested for the Waste Acceptance Criteria leachate test to further understand which landfill the materials tested would likely be accepted at. The 3 No. samples above are verified as Hazardous with the rest as Non-Hazardous.

Notwithstanding this preliminary assessment, it is the contractor's responsibility, in association with the operator and / or owner of the landfill to classify the materials for disposal in line with current guidance. Landfill waste acceptance criteria (WAC) leachate testing and classification prior to disposal to landfill should be undertaken to confirm the waste classification.

4.4 pH and Sulphate

The site is classified as 'Brownfield' in accordance with BRE Special Digest 1 in respect to chemical attack on buried concrete. As part of the SSL 2021 GI, 26 No. pH and Sulphate tests (2:1 water extract) were undertaken. Based on the laboratory data available to date, the results identify that a concrete class of DS1-AC1 is suitable.

[8] CAR-SOIL Control of Asbestos Regulations (2012), Interpretation for Managing and working with asbestos in soil and construction demolition materials – Industry Guidance. Published by Comtaminated Land: Applications if Real Environments (CL;AIRE).

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4.5 Updated Risk Assessment

4.5.1 Potential Sources of Contaminants

Potential contamination sources from review of regulatory data, historical maps have been identified and are summarised in Table 5-1. The 'Contaminants of Concern' in this risk assessment are based primarily on information from the review of historical information & various site walkovers.

Table 4-1: Potential Sources of Contamination

Potential Source	Location	Likely Age	Potential Contaminants of Concern
Made Ground	Onsite	From 1800s to present	Metals, sulphates, PAHs, solvents, fuel and oil waste and asbestos.
Fuel and oil spills from car parking retained within soils	On and off site	From 1970s to present	Petroleum hydrocarbon, fuel, oils.
Ground gas sourced from Made Ground and nearby infilled reservoir	On and off site	From 1800s to present	Methane, carbon dioxide.
Various commercial / industrial site uses	On and off site	From 1800 to present	Leachable contaminants: metals, PAHs, petroleum, hydrocarbons.

4.6 Receptors and Pathways

Site specific pathway-receptor linkages have been identified in Table 5-2 with respect to the sources outlined in Table 4-1 and with respect to the anticipated future uses.

Table 4-2: Receptor and Pathways

Receptor		Pathway
Human Health	Future site users / visitors.	Direct / dermal contact. Inhalation of contaminated dusts, gas & vapour.
	Offsite land users.	Inhalation / ingestion of contaminated dust.
	Investigation and construction workers.	Direct / dermal contact. Ingestion / inhalation of contaminated soils. Inhalation of gas / vapour.
Controlled Waters	Principal Aquifer within the Chester Formation.	Leaching of contaminants through permeable strata.
Below Ground Infrastructure	Buried concrete foundations. Services pipework (if any).	Direct contact.

4.7 Risk Assessment

The updated qualitative risk assessment of the potential pollutant linkages described above is presented in Appendix B. Based on the assessment, the likelihood of potential ground contamination affecting the Proposed Development is considered to be low.

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4.8 Remediation Strategy

4.8.1 NMS

The preliminary risk assessment is set out in the BH Desk Study. The site specific ground investigations by SSL (2015 / 2021) provide a geoenvironmental assessment of the site. An updated risk assessment is provided in Appendix B of this report.

Based on the site specific data from beneath the proposed footprint of NMS and in the immediate vicinity, it is not considered that any remediation strategy is required. The majority of the chemical test results do not record any elevated determinands or presence of ACM.

The one exception is from the SSL 2015 GI. Waste materials were encountered in TP10a between 0.50-2.50 m BGL which is located outside of the current footprint of NMS. The earthworks / construction strategy for this particular area is as follows:

- Provide the main contractor with the SSL 2015 / 2021 GI reports & hold pre-start meeting to advise the ground conditions and the results of TP10a.
- During the excavation for NMS, a watching brief by a competent engineer is required if any excavations are to progress in the area of TP10a.
- If waste materials are recorded during excavation, they shall be removed and stored in a separate area of the site before removal to landfill.
- A report shall be produced by the main contractor detailing the area of excavation, volumes of material removed, any chemical testing results & landfill waste tickets.

4.8.2 Rest of site

As described above, the preliminary risk assessment is set out in the BH Desk Study. The site specific ground investigations by SSL (2015 / 2021) provide a geoenvironmental assessment of the site. An updated risk assessment is provided in Appendix B of this report.

The long industrial history of the site, the heavy bombing of the site that occurred during the Manchester Blitz and the redevelopment of the site into a car park with associated terraces has led to a varying thickness of MG across the site with recorded localised evidence of ground contamination. Elevated levels of lead above commercial thresholds in TP104 and TP111 have been recorded within the Made Ground (MG).

In addition to lead, the MG on site has also recorded the presence of loose fibres of ACM in TP108 of 0.003% (below 0.1% - Hazardous Waste threshold). The source of these asbestos fibres is likely to be the uncontrolled demolition of the buildings that were bomb damaged and the levelling of this debris over the site. It should be noted that during the SSL 2015 GI and 2021 GI's, 25 No. additional ACM identification tests did not record any ACM across the site. In addition, the area of Arkwrights Mill has been remediated by Sanctus. The natural materials underlying the MG have been found to be free from contamination.

The proposed development of the site involves the excavation of a significant area of the site (approximately 60-70%) for basement construction, foundation excavation and a piled wall with the remaining site area being covered by hard standing or soft landscaping with appropriate build ups. This will result in the vast majority of MG being removed from the site with the remaining materials being located beneath hard standing. There is therefore no need for specific remedial measures above those that will be achieved by the proposed construction.

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The extent of proposed basement, hard landscaping & soft landscaping (minimum 0.60m clean build ups) within the development proposals, a significant amount of the source is to be removed, thus the source-pathway-receptor linkage is broken. The remaining pathways are blocked by the presence of hardstanding and proposed soft landscaping build up's (tree pits/planters – lined/separate from the existing material). It is therefore anticipated that upon completion of the proposed development risks to future site users from the identified site contamination will have been suitably mitigated.

Validation testing will be undertaken during any enabling/construction works. During construction, suitable and appropriate health and safety measures/procedures will need to be implemented to protect the workforce from any associated risk, in particular appropriate mitigation measures and methodology to minimise the production of dust. How this is to be managed during the site works will need to be included in the contractors Risk Assessment along with details of any watching briefs for areas of concern. All remediation/validation works are to be supervised by a suitably qualified professional from the Enabling Works Contractor and Main Contractor. Details/qualifications of the suitably qualified professional undertaking the works for the contractor(s) are to be submitted for approval to the Local Authority prior to commencement on site.

Any fill material, either site won arisings or imported onto site, and imported topsoil material, will be tested for a specific list of determinands (including ACM) to ensure suitability for use.

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5 Geotechnical Considerations

5.1 General

An engineering assessment of the geotechnical constraints of the proposed development has been carried out on the basis of the information available. The key elements in respect of the groundworks and foundations to the proposed development are summarised in the following sections.

5.2 Excavation and Earthworks

There is a substantial change in level across the Site, with levels falling away from Angel Street down to Miller Street. Overall, the proposed development site generally slopes in a westerly direction towards the western corner of the Site midway along Miller Street. The Site can be split into two areas separated by an existing rough S Shaped embankment, namely:

- The eastern area predominantly comprises the former archaeological excavation for Arkwrights Mill. The majority of the platform is between 46 – 47 m AOD, however, the maximum elevation (to the nearest metre) is ~48 m AOD in the far eastern corner of the platform, with a minimum elevation of ~45 m AOD in the northern corner.
- The western area currently comprises existing car parking, however, during the construction of 1 Angel Square this area of site was utilised as a site compound with two temporary buildings. The area slopes to the southwest from a maximum elevation of ~44.5 m AOD in the northern corner, with a minimum elevation of ~41 m AOD in the western corner.

There is thus currently a ~7 m difference in height across the Site separated by slopes with localised or potentially buried retaining structures.

Reduced level excavations to achieve formation level and those excavations for internal structural foundations and service trenches are likely to encounter Made Ground, superficial deposits (Glacial Till and Glaciofluvial deposits) and relict substructure. Excavations should be feasible using conventional plant although allowance should be made for the use of pneumatic breakers to assist in the removal of any buried foundations or similar obstructions along with excavations into rock. All excavations should be supported in accordance with the guidelines presented in CIRIA Report 97[9].

During construction, it is envisaged that any perched water seepages will be relatively minor and could be controlled by sump pumping methods. It should be noted, however, that where locally more significant water ingress is encountered then more substantial water control measures may be required.

Any cohesive materials encountered during excavation are likely to be prone to deterioration from moisture and uncontrolled seepages. As such, any excavations in such materials should be covered by a blinding layer of concrete or other approved material as soon as they are exposed and formations for infrastructure should be protected by a sacrificial layer until the Permanent Works are installed.

Any excavated material and existing below ground obstructions encountered could be crushed and processed for re-use elsewhere subject to suitability and acceptability testing. Any unsuitable material/arisings leaving site will need to be classified for waste disposal purposes in the usual way.

[9] CIRIA Report 97. *Trenching Practice*. CIRIA R97, 1983.

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5.3 Foundations

5.3.1 General

Based on the available information, a ground model has been created in respect of the ground conditions under the site, which are likely to influence the proposed foundation solution.

Assessment has been made in respect of shallow and deep options for foundation solutions. However, based on the information obtained to date it is considered likely that a piled solution will provide the most cost-effective foundation solution for the proposed basement, external columns, and internal columns. The piles will be used to transfer the loads of the buildings down to a suitable bearing stratum, namely the sandstone bedrock (Chester Formation).

The sulphate content and pH of soil indicate that a minimum concrete class of DS-1 with an ACEC Class of AC-1 could be adopted for buried structures in accordance with BRE Special Digest 1 (refer to Section 0).

5.3.2 Shallow Foundations

Based on the current development proposals and the SSL 2021 GI information available, the stratum likely to be encountered at a sensible founding level for a shallow foundation solution for internal columns will include superficial deposits (Glacial Till and Glaciofluvial Deposits). Due to the indicative in-situ strengths of these materials, allowable bearing capacities are unlikely to be sufficient for the column loads associated with the proposed 10 and 11 storeys.

The foundations for NMS are proposed to be a shallow solution comprising strip footings or a raft, based on a bearing capacity of 60 KPa in the natural clay or 50 KPa in the MG. The formation should be tested insitu to ensure the bearing capacity beneath the NMS can be achieved (plate bearing tests or similar).

5.3.3 Piled Foundations

Due to the relatively heavy column loads for 2&3 Angel Square, a bored piled foundation solution is considered to be the most appropriate foundation solution that is practical and comparatively predictable in terms of buildability.

The piling technique, method of installation and design will depend on many factors, such as applied load, groundwater level, bearing strata, presence of obstructions, cost and speed of construction. Given the ground conditions encountered and that the current development proposal includes a structure with large spans and/or high loads, it is anticipated that piled foundations will be the most cost-effective solution.

If a piled foundation solution is adopted, the pile design and piled retaining wall design should be undertaken by a specialist piling contractor but for guidance purposes a rock socketed pile, socketed into the sandstone bedrock strata (Chester Formation) should provide the following capacities:

- 600 or 750 mm diameter piles approximately 20-25 m long (approximately 10m rock socket) with an anticipated capacity of 2000 kN or 2,750 kN per pile respectively. The pile diameters have been assumed for design purposes, the final design of the piles will be the responsibility of a specialist subcontractor.
- Where the building is split level (lower and upper ground floor levels) and retaining walls will be required to accommodate the change in level. The vertical (secant) piled retaining wall is anticipated to consist of 750 mm diameter piles to approximately 20-25 m long with an anticipated capacity of 2,750 kN per pile respectively. Again, the pile diameters and pile lengths have been assumed for design purposes, the final design of the piles will be the responsibility of a specialist subcontractor. The piled wall will need to retain the northern boundary and be propped where necessary in the temporary case, whilst in the permanent case, the wall will be propped by floor slabs, and the wall will also support the external/internal building column

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loads. The retaining structure will also need to be protected from water ingress. A suitable tanking system is to be incorporated in accordance with the architect's specification and detailing.

- Please note, it may be possible to batter back the ground to allow a concrete cast in-situ wall to be locally constructed on specific elevations to each building. This will be investigated during the subsequent design process once additional information becomes available. The retaining walls will be propped in the permanent case, but may require temporary propping during construction – to be designed and completed by others.
- Please note, it is likely that piling will have to be completed at various levels due to the nature of the sloping site (i.e. secant piled retaining wall/bearing piles installed at grade and bearing piles at a lower level within the lower ground floor footprint). Construction sequencing of the substructure should be discussed at an early stage in the development process for risk management and to ensure an efficient approach is adopted.
- Based on the current anticipated building heights and associated envisaged loads, internal columns are likely to require multiple piles per column. Although multiple piles per column will generally be used in this instance, due to the relatively high column loadings the pile design will need to allow for any minor eccentric loadings arising from the offset between the axis of the pile and the axis of the structural column caused by the limitations in the tolerance of installation. It should also be noted that due to the piling platform level likely being higher than the envisaged pile cut off levels, the limitations on such tolerances is likely to be challenging and as such, internal pile caps are likely to require oversizing to manage any associated risks.

5.4 Ground Bearing Slabs

A suspended floor slab should be utilised on NMS. The use of ground bearing slabs can be considered within the proposed 2 & 3 Angel Square development, assuming typical loadings of 20 kN/m^2. A typical under slab formation may generally comprise 150 mm of compacted stone, sand layer and a damp proof membrane.

The formation will need to be proof rolled to ensure suitability. It should be noted that any soft spots encountered should be removed and replaced with appropriate structural fill. Any obstructions encountered should also be removed.

The compacted stone should be DTp Type 1[10] in frost susceptible areas but in non-frost susceptible areas, such as within the confines of the proposed buildings, alternative materials such as DTp Class 6F2[11] may be considered. Recycled site won material could be considered for re-use subject to suitability.

5.5 Highways and Permissions

The Site is currently bounded to the north by Angel Street and to the south by Miller Street. Appropriate permits and permissions will be required from the relevant authorities to allow the construction works to be undertaken.

It is currently understood that any existing site services are to be diverted around or grubbed up/grouted up as required prior to commencement on the main construction works and as part of a separate works package, however this should be verified prior to commencement on site.

Any such works will need to be undertaken in accordance with the relevant permits and permissions from the relevant authorities.

[10] DTp (2001). *Specification for Highway Works, Volume 1 Series 800: Clause 803*. Department of Transport, HMSO, May 2001.
[11] DTp (2003). *Specification for Highway Works, Volume 1 Series 600: Table6/1*. Department of Transport, HMSO, November 2003.

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6 Anticipated Design for Costing Purposes

The anticipated design for costing purposes can be summarised as follows:

NMS

- Site clearance and removal of obstructions in areas of proposed substructure.
- Earthworks re-profiling where required. Site won material to be processed and re-used on-site (dependant on chemical and geotechnical suitability) or disposed of to a suitable waste acceptance facility.
- Installation of shallow foundations.
- The floor slab is proposed to be suspended.

2&3 AS

- Site clearance and removal of obstructions in areas of proposed substructure.
- Earthworks re-profiling. Site won material to be processed and re-used on-site (dependant on chemical and geotechnical suitability) or disposed of to a suitable waste acceptance facility.
- Installation of the vertical embedded retaining wall (secant piled wall currently envisaged) along with the installation of the piled foundations for up to 10 and 11 storeys.
- Installation of associated piled wall capping beam.
- The ground floor slab is proposed to be ground bearing.

General Risk Items

- Final piled foundation and retaining wall design should be undertaken by a specialist piling contractor as part of the detailed design.
- Physical obstructions from historic walls/floor slabs/substructure/infrastructure – potential risk for installation of secant piled wall and piled foundation solution. A series of trial trenches are may be required to reduce/remove the risk of obstructions prior to pile installation.
- The site is located in a busy city centre environment and as such, noise and vibration restrictions may be imposed.
- The site is classified as 'medium' risk from UXO, therefore it is considered that UXO engineer supervision is required during intrusive works onsite (enabling works and piling).
- Post fieldwork groundwater levels from the SSL 2021 GI undertaken to date identify a groundwater regime within the sandstone bedrock (~26). It should be noted that any localised groundwater encountered within the Made Ground and superficial deposits may vary across the site. An allowance should be made for sump pumping within the cost plan.
- The SSL 2021 GI ground gas monitoring data available to date indicates a typical ground gas regime of Characteristic Situation 1 (CS1). .

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- The site is classified as 'Brownfield' in accordance with BRE Special Digest 1 in respect to chemical attack on buried concrete. A concrete class of DS1 –AC1 is suitable for the proposed development.
- Any Temporary Works requirements are the responsibility of the Main Contractor (MC). Where temporary excavations are required, temporary support is likely to be needed. Subject to sequencing and proposed construction methodology from the MC, temporary excavations requiring backfill should be replaced with suitable fill material in accordance with an Excavation and Filling Specification. In addition, when preparing formations, all soft spots are to be removed and replaced with suitable fill material/upfill concrete.

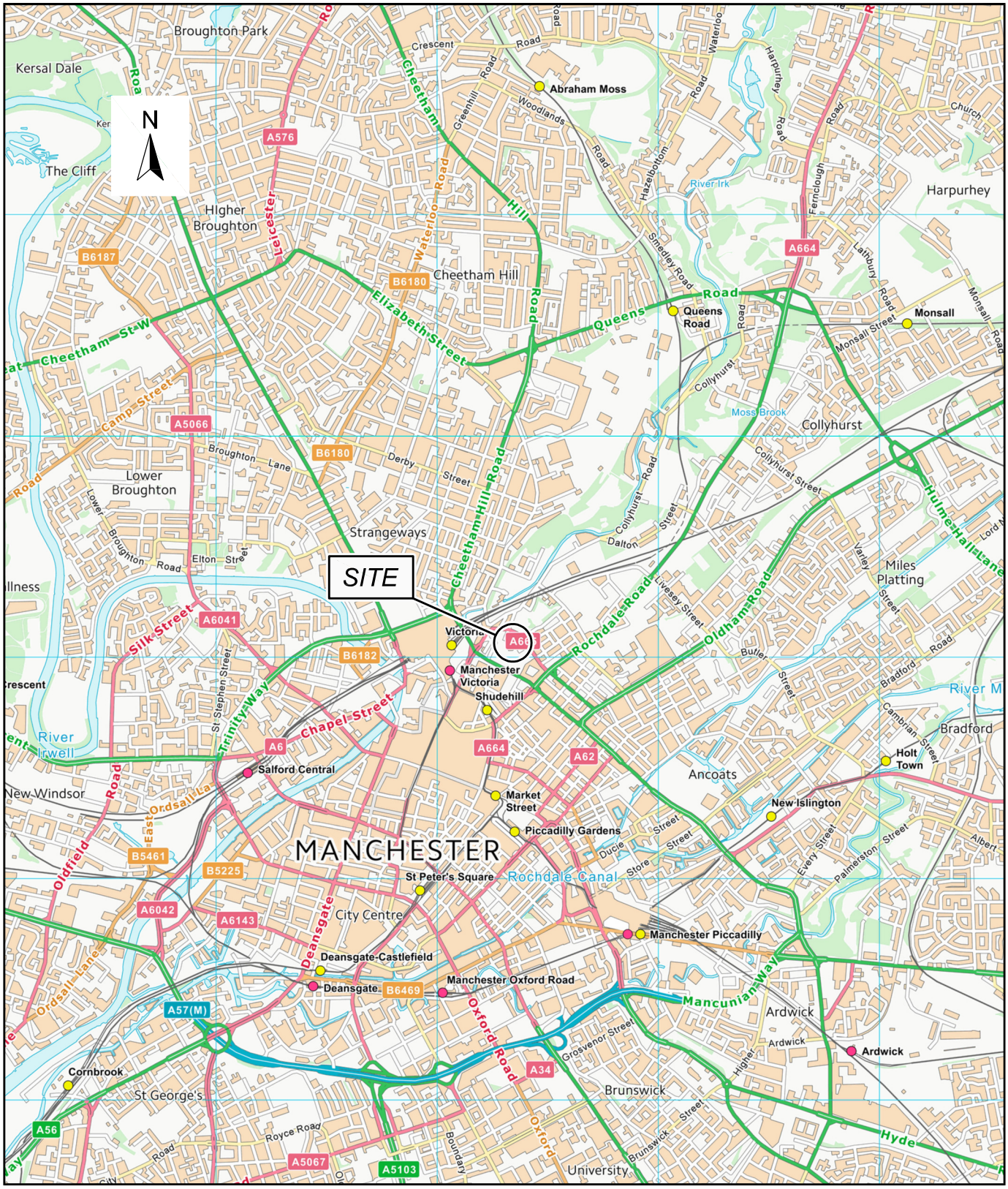
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Appendix A Structural Soils Information

A.1 Exploratory Hole Location Plan

A.1.1 Exploratory Hole Logs

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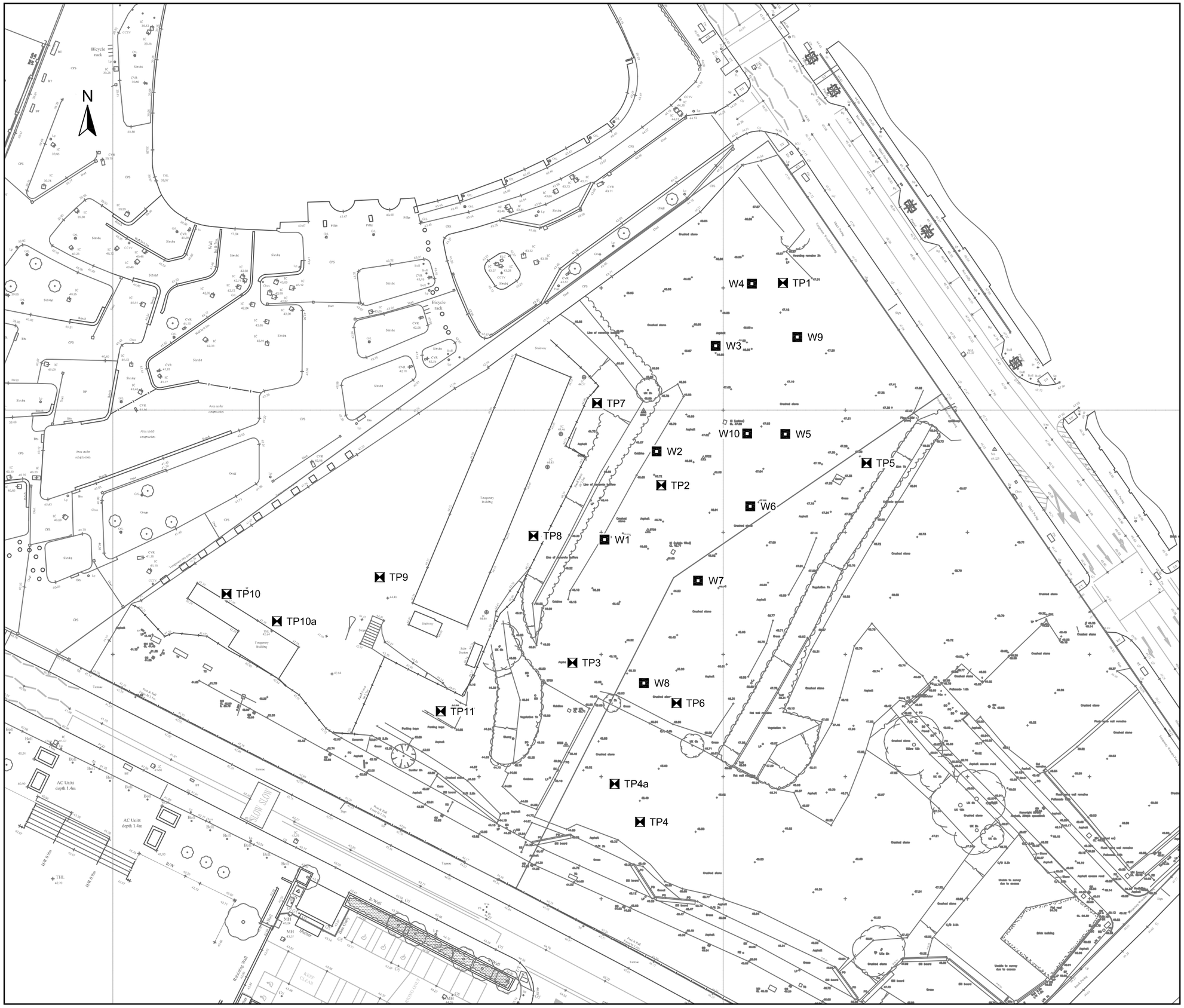
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m	1:25,000	-

CLIENT: MEPC Ltd

PROJECT: 2 & 3 Angel Square, Manchester

TITLE: SITE LOCATION MAP

JOB NO	GRID REF	SCALE BAR	ORIGIN SIZE	FIGURE
765325	SJ 843 990	0 250 500 750 1,000m	A4	1



LEGEND

- Trial Pit Location
- WAC Stockpile Locations

REV	DATE	DESCRIPTION	BY	CHD	APR
01	18.02.2015	-	MW	GR	-

DIMENSION	SCALE	ORIGIN SIZE
m	1:600	A3

STRUCTURAL SOILS

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CLIENT

NOMA (GP) Ltd

PROJECT

2&3 Angel Square, Manchester

TITLE

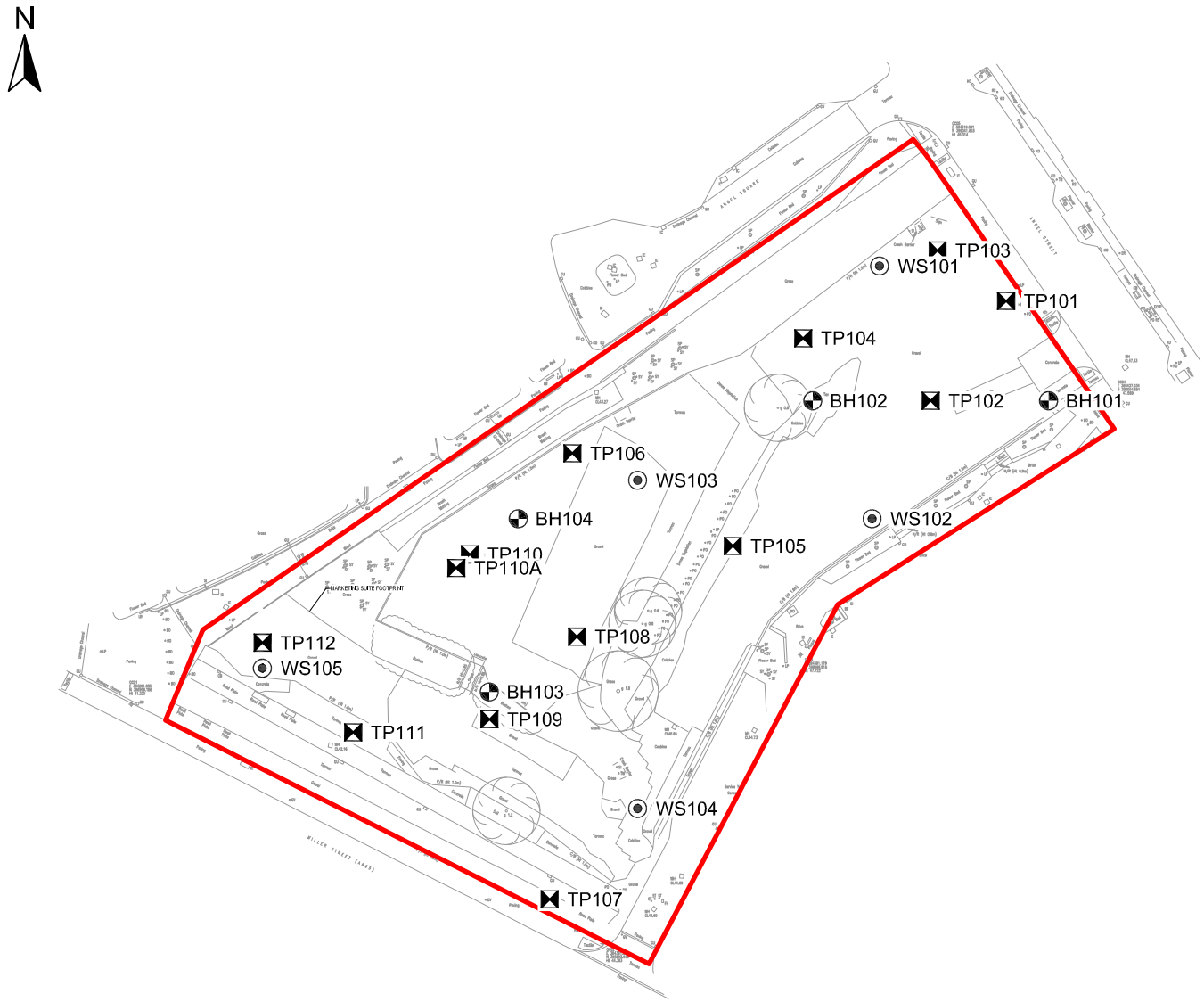
EXPLORATORY HOLE LOCATION PLAN

JOB NO	FIGURE
763315	2

DRAWING STATUS	REV
-	01

SCALE BAR

0 5 10 15 20 25 30m



LEGEND

- Trial Pit Location
- Borehole Location
- Window Sample Location

REV	DATE	DESCRIPTION	BY	CHD	APR
00	29.09.2021	-	NP	JMC	-

DIMENSION	SCALE	ORIGIN SIZE
m	1:1000	A4

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PROJECT

2 & 3 Angel Square, Manchester

TITLE

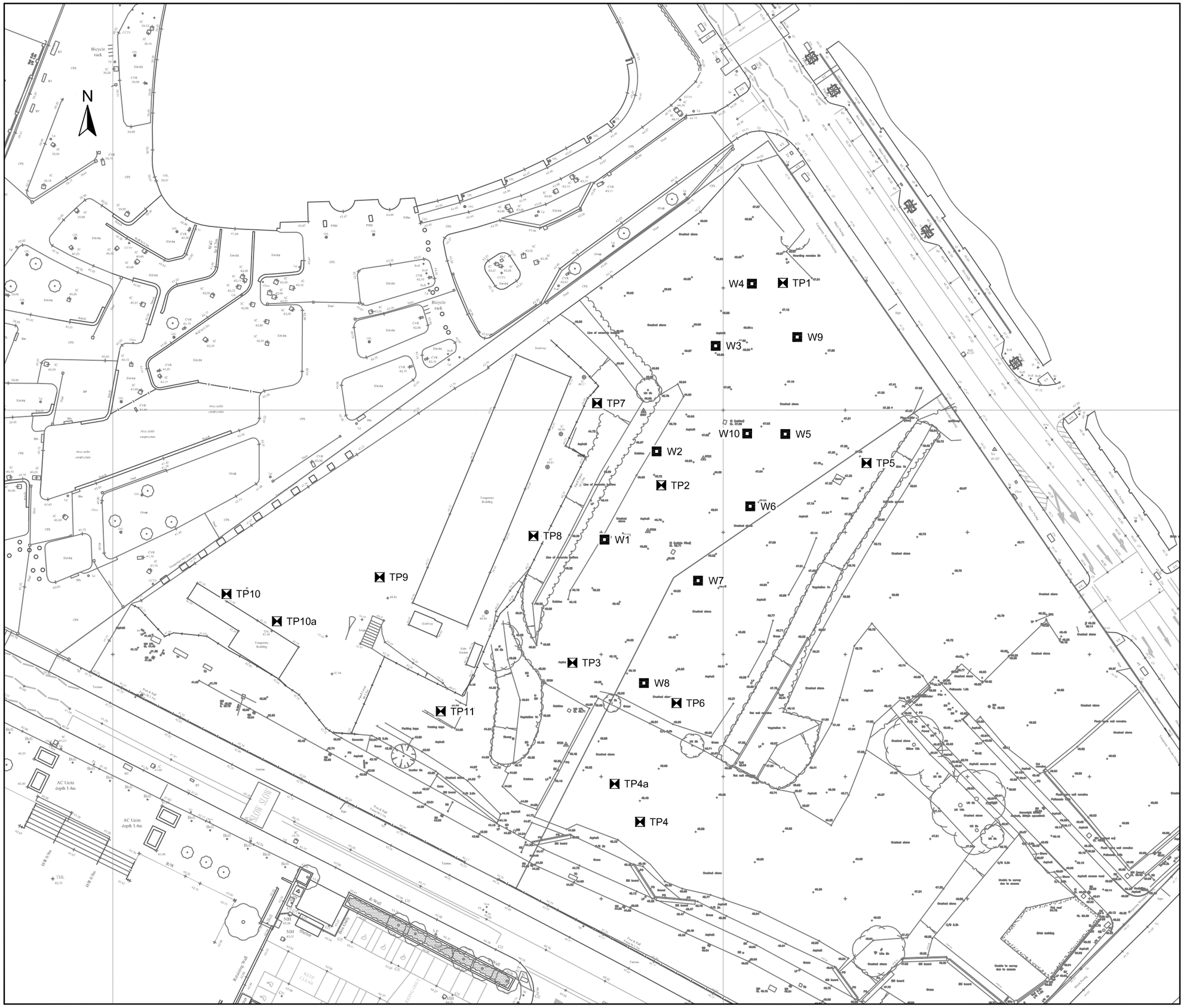
EXPLORATORY HOLE LOCATION PLAN

JOB NO	FIGURE
765325	2

DRAWING STATUS	REV
-	00

SCALE BAR

0 10 20 30 40 50m



LEGEND

- Trial Pit Location
- WAC Stockpile Locations

REV	DATE	DESCRIPTION	BY	CHD	APR
01	18.02.2015	-	MW	GR	-

DIMENSION	SCALE	ORIGIN SIZE
m	1:600	A3

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CLIENT

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PROJECT

2&3 Angel Square, Manchester

TITLE

EXPLORATORY HOLE LOCATION PLAN

JOB NO	FIGURE
763315	2

DRAWING STATUS	REV
-	01

SCALE BAR

0 5 10 15 20 25 30m

STRUCTURAL SOILS

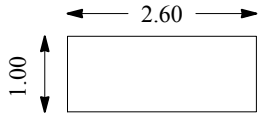
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP1**

Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.00-0.55	1	B				MADE GROUND: Black brown clayey slightly sandy subangular to subrounded fine to coarse GRAVEL of brick and ash with high cobble and medium boulder content.			
0.30	1	ES	Tx2, Jx2, Vx2					(0.80)	
0.70	2	ES	Tx2, Jx2, Vx2				44.86	0.80	
						Stiff brown silty CLAY with pockets of grey silt and rare gravel of coal.			
1.00-1.50	2	B		≈				(0.70)	
							44.16	1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. Slight groundwater seepage at 1.10m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:13 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP1**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**2** of **3**

TP1 Face A





TP1 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:13 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP1**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.66**	**E:384409.8 N:399020.8**	**3** of **3**

TP1 Face C





TP1 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

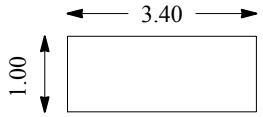
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP2**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**1** of **3**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: BRICKWORK.	46.15	0.08	
						MADE GROUND: Black brown slightly clayey slightly sandy angular to subangular fine to coarse GRAVEL of brick and sandstone with medium cobble content.	46.08	0.15	
0.30	1	ES	Tx2, Jx2, Vx2			Stiff brown mottled light blue silty slightly sandy CLAY with rare fine gravel of sandstone and coal.		(0.85)	
0.90	2	ES	Tx2, Jx2, Vx2				45.23	1.00	
0.90-1.00	3	B				Trial pit terminated at 1.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP2**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**2** of **3**

TP2 Face A





TP2 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:14 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP2**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**46.23**	**E:384389.9 N:398987.7**	**3** of **3**

TP2 Face C





TP2 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:15 | GR.
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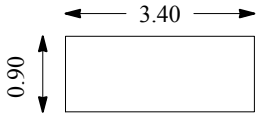
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP3**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**1** of **3**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.30	1	ES	Tx2, Jx2, Vx2			Stiff light brown mottled blue silty slightly sandy CLAY with rare fine to medium gravel of sandstone and coal.		(1.00)	
0.90	2	ES	Tx2, Jx2, Vx2				44.86	1.00	
						Trial pit terminated at 1.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:17 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP3**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**2** of **3**

TP3 Face A





TP3 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:18 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP3**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.86**	**E:384375.3 N:398958.6**	**3** of **3**

TP3 Face C





TP3 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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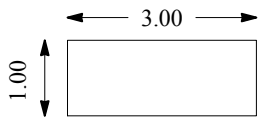
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP4**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**26.01.15**	**45.48**	**E:384386.4 N:398932.6**	**1** of **2**
	End: **26.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.00-0.20	1	B				MADE GROUND: Black slightly sandy locally slightly clayey angular to subangular fine to coarse GRAVEL of ash, brick and metals with high cobble and medium boulder content.		(0.80)	
0.40	1	ES	Tx2, Jx2, Vx2				44.68	0.80	
						MADE GROUND: BRICK foundations.		(0.50)	
							44.18	1.30	
						Trial pit terminated at 1.30m depth due to foundations in absence of archaeologist.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4**
Contract Ref:	Start: **26.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **26.01.15**	**45.48**	**E:384386.4 N:398932.6**	**2** of **2**

TP4 Face A





TP4 Face C

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:19 | GR.
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STRUCTURAL SOILS

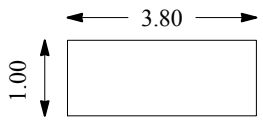
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP4a**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.50	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black slightly sandy locally slightly clayey angular to subangular fine to coarse GRAVEL of ash, brick and metals with high cobble and medium boulder content.			
1.00	2	ES	Tx2, Jx2, Vx2			. . . below 0.10m, wire rope.		(2.40)	
2.00	3	ES	Tx2, Jx2, Vx2				43.07	2.40	
						Trial pit terminated at 2.40m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**2** of **3**

TP4a Face A





TP4a Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:20 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP4a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**45.47**	**E:384382.2 N:398938.8**	**3** of **3**

TP4a Face C





TP4a Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:21 | GR.
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STRUCTURAL SOILS

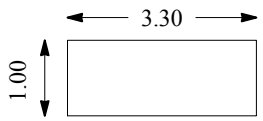
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP5**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light brown mottled light grey orange sandy angular to subangular fine to coarse GRAVEL of brick, glass and coal with high cobble content and brickwork present.			
0.50	1	ES				. . . below 0.65m, orange brown medium sand.			
						. . . below 0.80m, redundant water drain (100mm diameter) damaged.		(1.80)	
1.40	2	ES							
				≈			45.57	1.80	
1.80	3	EW				MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL in clayey matrix with pottery and snail shells.			
1.80	3	ES						(0.40)	
							45.17	2.20	
						Stiff to very stiff light brown mottled light blue silty locally slightly sandy CLAY.		(0.30)	
2.40	4	ES					44.87	2.50	
						Trial pit terminated at 2.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - water pipe detected.
2. Slight seepage of water at 1.80m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:21 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP5**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**2** of **3**

TP5 Face A





TP5 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:22 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP5**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**47.37**	**E:384423.5 N:398991.3**	**3** of **3**

TP5 Face C





TP5 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:22 | GR.
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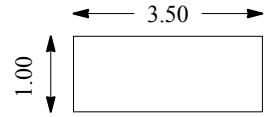
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP6**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL of ash, brick and glass with high cobble and low boulder content.		(0.50)	
0.40	1	ES	Tx2, Jx2, Vx2				45.52	0.50	
						Stiff to very stiff light brown mottled light blue silty locally sandy CLAY.			
0.70	2	ES	Tx2, Jx2, Vx2						
								(1.50)	
1.50	3	ES	Tx2, Jx2, Vx2						
							44.02	2.00	
						Trial pit terminated at 2.00m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trila pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:22 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP6**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**2** of **3**

TP6 Face A





TP6 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:23 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP6**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**46.02**	**E:384392.4 N:398952.1**	**3** of **3**

TP6 Face C





TP6 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:24 | GR.
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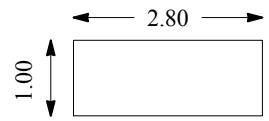
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP7**

Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.64	0.10	
						Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.44	0.30	
0.40	1	ES	Tx2, Jx2, Vx2	≈		Black dark grey sandy angular to subrounded fine to coarse GRAVEL of ash, brick and sandstone.	44.24	0.50	
0.80	2	ES	Tx2, Jx2, Vx2			Very stiff light brown mottled light blue slightly sandy silty CLAY.		(1.00)	
							43.24	1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - trial pit clear.
2. Slight seepage of water at 0.50m.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:24 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP7**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**2** of **3**

TP7 Face A





TP7 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:25 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP7**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.74**	**E:384379.3 N:399001.1**	**3** of **3**

TP7 Face C





TP7 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:26 | GR.
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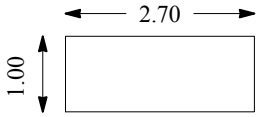
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP8**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**1** of **3**
	End: **28.01.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.52	0.10	
						Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.42	0.20	
0.30	1	ES	Tx2, Jx2, Vx2			Black slightly clayey sandy angular to subangular fine to coarse GRAVEL of brick, ash and sandstone with low cobble content.		(0.50)	
						. . . below 0.65m, redundant water drain (100mm diameter) damaged.	43.92	0.70	
0.80	2	ES	Tx2, Jx2, Vx2			Stiff to very stiff light brown mottled light blue silty slightly sandy CLAY		(1.00)	
						Trial pit terminated at 1.70m depth.	42.92	1.70	

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's - water pipe detected.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:29 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP8**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**2** of **3**

TP8 Face A





TP8 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:29 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP8**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.62**	**E:384368.9 N:398979.4**	**3** of **3**

TP8 Face C





TP8 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:30 | GR.
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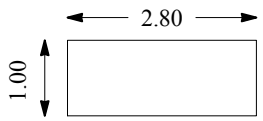
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP9**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15** End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: ASPHALT.	44.38	0.10	
						MADE GROUND: Light grey dark grey angular medium to coarse GRAVEL of limestone.	44.18	0.30	
0.25	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black sandy angular to subangular fine to coarse GRAVEL of ash, brick and sandstone.	44.03	0.45	
						Very stiff light brown mottled light blue silty slightly sandy CLAY.		(0.85)	
1.00	2	ES	Tx2, Jx2, Vx2				43.18	1.30	
						Trial pit terminated at 1.30m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's- trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:30 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP9**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**2** of **3**

TP9 Face A





TP9 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:31 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP9**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**44.48**	**E:384343.7 N:398972.7**	**3** of **3**

TP9 Face C





TP9 Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:31 | GR.
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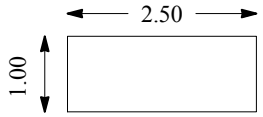
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP10**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**41.67**	**E:384318.6 N:398969.9**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light grey angular coarse GRAVEL.	41.57	0.10	
						MADE GROUND: Light brown gravelly fine to medium SAND. Gravel is angular medium to coarse limestone and brick.	41.37	0.30	
						Trial pit terminated at 0.30m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's- trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit terminated at 0.30m due to hard standing asphalt, unable to penetrate.
4. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**41.67**	**E:384318.6 N:398969.9**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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STRUCTURAL SOILS

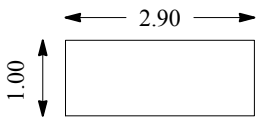
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP10a**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**27.01.15** End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Light grey dark grey clayey slightly sandy angular to subangular fine to coarse GRAVEL of limestone.	42.05	(0.30) 0.30	
0.40	1	ES	Tx2, Jx2, Vx2			MADE GROUND: Black dark grey angular to subrounded fine to coarse sandy GRAVEL of ash, brick and sandstone, including brickwork. . . . below 0.50m, waste materials including old shoes, plastic ties, fabrics.			
1.00	2	ES	Tx2, Jx2, Vx2					(2.50)	
2.00	3	ES	Tx2, Jx2, Vx2						
2.60	4	ES	Tx2, Jx2, Vx2			. . . below 2.50m, no waste materials.	39.55	2.80	
						Trial pit terminated at 2.80m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried servoces and UXO's - trial pit clear.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:32 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**2** of **3**

TP10a Face A





TP10a Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:33 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP10a**
Contract Ref:	Start: **27.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **27.01.15**	**42.35**	**E:384326.9 N:398965.4**	**3** of **3**

TP10a Face C





TP10a Face D

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:33 | GR.
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STRUCTURAL SOILS

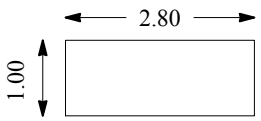
FINAL TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2&3 Angel Square	**Buro Happold**	**TP11**

Contract Ref:	Start:	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	**28.01.15** End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**1** of **3**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						MADE GROUND: Black slightly clayey sandy angular to subrounded fine to coarse GRAVEL of brick and ash.		(0.60)	
0.30	1	ES	Tx2, Jx2, Vx2				43.21	0.60	
						MADE GROUND: Orange brown fine to medium SAND.			
						. . . at 0.70m, electric cables, no signals detected.	43.01	0.80	
						MADE GROUND: Black dark grey slightly clayey sandy angular to subangular fine to coarse GRAVEL of brick and ash.		(0.70)	
0.90	2	ES	Tx2, Jx2, Vx2						
						. . . below 1.30m, brown sandy clayey angular to subrounded fine to coarse gravel of ash and sandstone.			
1.40	3	ES	Tx2, Jx2, Vx2				42.31	1.50	
						Trial pit terminated at 1.50m depth.			

Plan (Not to Scale)



General Remarks

1. Trial pit scanned every 0.30m to detect both buried services and UXO's.
2. No groundwater encountered whilst excavating.
3. Trial pit backfilled on completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:34 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP11**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**2** of **3**

TP11 Face A





TP11 Face B

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:34 | GR.
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STRUCTURAL SOILS

FINAL TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2&3 Angel Square		**Buro Happold**		**TP11**
Contract Ref:	Start: **28.01.15**	Ground Level (m):	National Grid Co-ordinate:	Sheet:
763315	End: **28.01.15**	**43.81**	**E:384353.7 N:398950.7**	**3** of **3**

TP11 Face C



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**GRushton**	CAH

GINT_LIBRARY_V8_05.GLB LibVersion: v8_05 - Lib0004 PrjVersion: v8_05 - Core+Logs 0003 | Log TRIAL PIT LOG | 763315 ANGEL SQUARE.GPJ - v8_05 | 10/04/15 - 16:35 | GR.
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STRUCTURAL SOILS

DRAFT

BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**28.07.21** End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**1** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
0.20-0.50	1	B								MADE GROUND: Blackish brown gravelly fine to coarse SAND. Gravel is angular to subangular of brick, concrete, hardcore and sandstone. Low cobble content of brick.	(1.90)	
0.90-1.20	2	B										
1.50-1.95		SPT	N=13									
1.50-1.95	4	B										
											2.10	
2.10-2.50	5	B								Stiff brown slightly gravelly CLAY. Gravel is fine to coarse of sandstone, quartzite and mudstone.		
2.50-2.95	6	UT100	100 blows 89% recovery									
2.95-3.10	7	D										
3.50-3.95		SPT	N=23									
3.50-3.95	10	B										
3.50-3.95	9	D										
3.50-3.95	9	DSPT									(4.15)	
4.50-4.95	11	UT100	100 blows 100% recovery									
4.95-5.10	12	D										
5.50	13	D										
6.00-6.30		SPT	N=100*									
6.00-6.30	15	DSPT										
6.00-6.25	16	B										
6.25-6.50	17	B								Very dense light brown sandy fine to coarse subrounded to rounded GRAVEL of quartzite and sandstone. Sand is fine to coarse. Medium cobble content of sandstone and quartzite.	(1.35)	
7.00	18	D										
											7.60	
7.50-7.72		SPT(c)	N=125*									
7.50-8.00	20	B								Very dense orangish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite, sandstone and mudstone.		
8.50	21	D										

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
28/07/21	17:44	1.20	None	200	Dry
29/07/21	08:00	1.20	None	200	
29/07/21	18:00	12.22	12.00	150	11.70

Chiselling / Slow Progress

From	To	Duration (hh:mm)
6.25	7.60	03:00
9.50	11.00	02:00
16.64	18.00	01:30

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. Cable percussion drilling to 18.00m with 200mm and 150mm diameter casing and tools.
4. Stainless steel casing (3m lead lengths) used to allow UXO scan to be carried out as borehole is

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**28.07.21** End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**2** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00-9.33		SPT	N=83*							Very dense orangish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite, sandstone and mudstone. *(stratum copied from 7.60m from previous sheet)*	(4.30)	
9.00-9.33	23	DSPT										
9.00-9.50	24	B										
10.00	25	D										
10.50-10.80		SPT	N=100*									
10.50-10.80	27	DSPT										
10.50-11.00	28	B										
11.50	29	D									11.90	
12.00-12.22		SPT	N=214*							Stiff brown slightly gravelly very sandy CLAY.	(3.10)	
12.00-12.22	31	DSPT										
12.00-12.50	32	B										
13.00	33	D										
13.50-13.80	34	UT100	150 blows 67% recovery									
14.00	35	D										
14.50	36	D									15.00	
15.00-15.16		SPT	N=250*							Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite and sandstone.	(1.60)	
15.00-15.50	39	B										
16.00	40	D									16.60	
16.50-16.64		SPT	N=214*							Extremely to very weak red brown medium grained SANDSTONE.	(1.40)	
16.50-17.00	43	B										
17.50	44	D									18.00	

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

drilled.
5. Rotary coring from 18.00m to 29.00m using water flush.
6. Installation as shown.
7. Cable percussion rig re-erected to complete installation and pull casing.
8. SPT hammer AR1862-2021 (E_r = 95.00%)

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**28.07.21** End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**3** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
18.00-18.50										Very weak laminated red brown medium grained SANDSTONE. Very closely to closely spaced horizontal discontinuities.		
18.00-18.07		SPT	N=375*	36	0	0						
18.50-19.00				100	74	0				. . . 18.00 to 18.50m core run mainly medium sand, bottom 180 mm extremely weak sandstone.		
19.00-19.50				100	62	20	NI			. . . 18.00 to 18.95m 45° rough planar discontinuity.		
19.50-20.50				80	55	10	50 100			. . . 19.00 to 19.10m 60° smooth planar discontinuity. . . . 19.00 to 19.57m extremely weak, recovered as sand with medium gravel sized fragments of sandstone.	(3.50)	
20.50-21.50										. . . 19.45 to 19.46m redbrown mudstone / clay . . . 19.70 to 19.80m extremely weak, recovered as sand with medium gravel sized fragments of sandstone.		
20.50		C		90	80	37	NI 50 180			. . . 20.30 to 20.50m 50° rough planar discontinuity. . . . 20.33 to 20.53m 50° rough planar discontinuity. . . . below 20.60m thinly bedded.	21.50	
21.50-23.00				100	93	70	NI 280			Very weak to weak red brown medium to coarse grained SANDSTONE. Closely to medium spaced horizontal discontinuities.	(3.10)	
23.00-24.50												
23.00		C		87	67	20				. . . 23.55 to 23.70 m medium grained sandstone. . . . 23.70 to 24.10 m medium to coarse, mainly coarse grained sandstone. . . . 24.10 to 24.50 m exremely to weak weak core non intact.	24.60	
24.50-26.00							NI NI NI			Extremely weak red brown fine and medium grained SANDSTONE. Frequent high angled rough planar discontinuities.	24.90	
											25.20	
25.50		C		98	80	73				Very weak red brown medium grained SANDSTONE. . . . 24.93 to 25.10m 80°smooth planar discontinuity. . . . 25.10 to 25.17m 80°smooth planar discontinuity, terminates against underlying discontinuity. . . . 25.15 to 25.20m 50°smooth planar discontinuity. . . . 25.30m high angled rough planar discontinuity at 90° to overlying discontinuities.		
26.00-27.50							50 200 380					
26.60		C		92	92	81				*Description on next sheet.*		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**28.07.21** End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**4** of **7**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
				92	92	81				Very weak to weak red brown medium to coarse SANDSTONE. Closely to medium spaced sub horizontal discontinuities.	(3.80)	
27.50-29.00										. . . 25.20 to 25.35m 50°smooth planar discontinuity.*(stratum copied from 25.20m from* previous sheet)		
27.65		C					50					
				84	84	73	200					
28.30		C					380					
											29.00	
29.00		C								Borehole terminated at 29.00 m		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH101**
Contract Ref:	Start: **28.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**5** of **7**

BH101 18.00-19.50m

28/07/2021:
29/07/2021:
30/07/2021:
02/08/2021:
04/08/2021:





BH101 19.50-21.50m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By:	**Robert Foster**	Logged By:	**IHayes**	Checked By:	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH101**
Contract Ref:	Start: **28.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**6** of **7**

BH101 21.50-24.50m





BH101 24.50-27.50m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By: **Robert Foster**	Logged By: **IHayes**	Checked By:

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH101**
Contract Ref:	Start: **28.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **03.08.21**	**47.52**	**E:384428.0 N:399004.2**	**7** of **7**

BH101 27.50-29.00m



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Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By:	**Robert Foster**	Logged By:	**IHayes**	Checked By:	AGS

STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**29.07.21** End: **03.08.21**	**46.88**	**E:384393.0 N:399004.2**	**1** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
										MADE GROUND: Tarmac	0.10	
0.30-0.50	1	B								MADE GROUND: Grey medium to coarse angular GRAVEL.	0.30	
0.30-0.50	2	D										
0.70-1.00	3	B								MADE GROUND: Blackish brown gravelly fine to coarse SAND. Gravel is angular to subangular of brick, concrete, hardcore, sandstone with low cobble content of brick.	0.70	
1.00-1.00	4	D										
1.20-1.35	5	UT	46 blows 300% recovery							Stiff brown slightly gravelly CLAY. Gravel is fine to coarse of sandstone, quartzite and mudstone.		
1.20-1.70	6	B										
1.70-1.70	7	D										
2.00-2.45		SPT	N=16									
2.00-2.45	8	DSPT										
2.00-2.50	9	B										
2.50	10	D										
3.00-3.45	11	UT	50 blows 89% recovery								(5.30)	
4.00-4.45		SPT	N=16							. . . 4.00 to 4.50m thin bed of stiff lminated brown CLAY		
4.00-4.45	12	DSPT										
4.00	13	B										
4.50	14	D								. . . below 4.50m becomes dark brown.		
5.00-5.45	15	UT	68 blows 0% recovery									
5.45	16	D										
5.50-6.00	17	B									6.00	
6.00	18	D								Very dense orangish brown slightly gravelly fine to coarse SAND. Gravel is subangular too rounded fine of sandstone, mudstone and quartzite.		
6.50-6.77		SPT	N=97*									
6.50	19	DSPT										
6.50-7.00	20	B										
7.00	21	D									(2.60)	
8.00-8.21		SPT	N=117*									
8.00-8.45	22	DSPT								. . . 8.00 to 8.60 m thin bed of stiff slightly gravelly very sandy CLAY.		
8.00-8.50	23	B										
8.50	24	D									8.60	
8.60-9.00	25	B								*Description on next sheet*		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
29/07/21	17:30	9.00	8.00	200	Dry
30/07/21	08:00	9.00	8.00	200	Dry
30/07/21	17:30	12.00	11.00	150	Dry
02/08/21	08:00	12.00	11.00	150	Dry
02/08/21	17:30	18.00	17.00	150	Dry

Chiselling / Slow Progress

From	To	Duration (hh:mm)
10.00	10.30	00:30
11.10	11.30	00:30
16.00	16.30	00:45
18.00	18.10	01:00
18.10	18.20	01:00

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. Cable percussion drilling to 18.20m with 200mm and 150mm diameter casing and tools.
4. Stainless steel casing (3m lead lengths) used to allow UXO scan to be carried out as borehole is

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**29.07.21** End: **03.08.21**	**46.88**	**E:384393.0 N:399004.2**	**2** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00	26	D								Very dense light brown sandy fine to coarse subrounded to rounded GRAVEL of quartzite and sandstone. Sand is fine to coarse. Medium cobble content of quartzite. *(stratum copied from 8.60m from previous sheet)*	(2.40)	
9.50-9.88		SPT	N=65*									
9.50-10.00	28	B										
9.55-9.95	27	DSPT										
10.00	29	D									11.00	
11.00-11.26		SPT	N=143*							Medium dense orangish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite, sandstone and mudstone.		
11.00	30	DSPT										
11.00-11.50	31	B										
11.50	32	D									(2.00)	
										. . . At 12.00m becomes slightly clayey.		
12.50-12.95		SPT	N=13									
12.50-13.00	34	B									13.00	
13.00	35	D-NR								Medium dense reddish brown brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse of quartzite and sandstone. and occasional black mudstone.		
14.00-14.45		SPT	N=23									
14.00-14.50	37	B									(2.50)	
14.50	38	D										
											15.50	
15.50-15.85		SPT	N=75*							Very dense reddish brown fine to medium SAND with occssional angular fine to medium gravel of extremely weak sandstone.		
15.50-15.50	40	B										
16.00	41	D									(2.70)	
17.00-17.12		SPT	N=259*									
17.00-17.50	43	B										
17.50	44	D										

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress

From	To	Duration (hh:mm)

General Remarks

drilled.
5. Rotary coring from 18.20m to 28.00m using water flush.
6. Installation as shown.
7. Cable percussion rig re-erected to complete installation and pull casing.
8. SPT hammer CD-1 2020 (E_r = 60.00%) used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**29.07.21** End: **03.08.21**	**46.88**	**E:384393.0 N:399004.2**	**3** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
18.00	45	D								. . . below 18.00 m gravel size fragments become medium to coarse and more frequent. Gravel is tabular, suggesting very thinly bedded sandstone.	18.20	
18.20-19.00				94	87	25				Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar to undulating discontinuities.		
19.00-20.00												
19.00		C		100	88	43				. . . 19.30 to 19.34m extremely weak red brown mudstone.		
20.00-21.50				100	97	52						
21.50-23.00										. . . 21.43 to 21.45m extremely weak red brown mudstone dip 30°, 50 mm thick.		
21.50		C		97	93	38	NI 93 280					
23.00-24.50											(9.80)	
24.00		C		93	93	63						
24.50-26.00				100	100	38				. . . 24.55 to 25.15m some medium elongate gravel of mudstone, becomes more frequent with depth, shows some current bedding.		
26.00-27.50										. . . 25.95 to 26.00m extremely weak		
26.00		C										
26.50		C		93	73	43				. . . 26.35m 20mm lamination of extremely weak mudstone dip 80° . . . 26.52 to 26.64m 70° rough planar discontinuity		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**29.07.21** End: **03.08.21**	**46.88**	**E:384393.0 N:399004.2**	**4** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
27.50-28.00				93 86	73 86	43 86	NI 93 280			. . . 26.65 to 26.74m lamination of red brown clay / mudstone, dip 70°/80° estimated, over medium sand . . . Below 26.86m coarse sand more frequent. . . . 26.87 to 27.00m 70° rough planar discontinuity		
28.00		C								Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar to undulating discontinuities. *(stratum copied from 18.20m from previous sheet)* . . . 27.20 to 27.40m 70° rough planar discontinuity	28.00	
										Borehole terminated at 28.00 m		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH102**
Contract Ref:	Start: **29.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **03.08.21**	**46.88**	**E:384393.0 N:399004.2**	**5** of **6**

BH102 18.20-20.00m

04/08/2021:





BH102 20.00-23.00m

Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By:	**Robert Foster**	Logged By:	**IHayes**	Checked By:	AGS

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		MEPC Ltd		BH102
Contract Ref:	Start: 29.07.21	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: 03.08.21	46.88	E:384393.0 N:399004.2	6 of 6

BH102 23.00-26.00m





BH102 26.00-28.00m

Method Used:	Cable Percussion + Rotary Cored	Plant Used:	Dando 2500 + Massenza M-I-3	Drilled By:	Robert Foster	Logged By:	IHayes	Checked By:	AGS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH103**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**21.07.21** End: **26.07.21**	**43.00**	**E:384345.0 N:398961.0**	**1** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
0.10-0.40	1	B								MADE GROUND: Brown sandy angular to subangular fine to coarse GRAVEL of concrete sandstone brick mudstone and hardcore. Sand is fine to coarse. Low cobble content of brick.	(1.10)	
0.10-0.95	101	ES									1.20	
0.90-1.20	2	B										
1.20-2.00	102	ES								MADE GROUND: Blackish brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular is fine to coarse of sandstone hardcore concrete and asphalt. Low cobble content of sandstone. Occasional rootlets present.	(1.75)	
1.50-1.95		SPT	N=17									
1.50-1.95	5	B									2.95	
2.00-2.95	103	ES										
2.50-2.95		SPT	N=27									
2.50-2.95	8	B										
3.50-3.95		SPT	N=12							MADE GROUND: Firm orangish brown gravelly CLAY. Gravel is angular to subangular fine to coarse of brick concrete quartzite and sandstone. Low cobble content of brick and concrete.	(2.05)	
3.50-4.00	104	ES										
3.50-3.95	11	B									5.00	
4.50-4.61		SPT	N=600*									
4.50-5.00	105	ES										
4.50-5.00	13	B										
5.00-5.50	14	B								Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine of sandstone quartz and mudstone.	(0.50)	
6.00-6.43		SPT	N=54*							Very dense reddish brown sandy subrounded to rounded fine to coarse GRAVEL of various lithologies including quartz and sandstone.	5.50	
6.00-6.43	17	B									(1.50)	
7.00-7.50	18	B									7.00	
7.50-7.95	19	UT100	150 blows 67% recovery							Stiff reddish brown slightly gravelly sandy CLAY. Gravel is sub rounded to rounded fine to coarse of quartz and sandstone. . . . 7.00m becomes slightly clayey	(1.00)	
8.00-8.50	20	B								Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to medium of sandstone, quartz and mudstone.	8.00	

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
21/07/21	17:09	6.45	6.20	200	5.70
22/07/21	08:15	6.45	6.20	200	Dry
22/07/21	16:29	12.00	12.00	150	6.00

Chiselling / Slow Progress

From	To	Duration (hh:mm)
4.00	5.00	01:30
11.30	12.00	01:00

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. Cable percussion drilling to 12.00m with 200mm and 150mm diameter casing and tools.
4. Stainless steel casing (3m lead lengths) used to allow UXO scan to be carried out as borehole is

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**CBailey**	

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH103**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**21.07.21** End: **26.07.21**	**43.00**	**E:384345.0 N:398961.0**	**2** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00-9.21		SPT	N=188*							Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to medium of sandstone, quartz and mudstone. *(stratum copied from 8.00m from previous sheet)*	(3.10)	
9.00-9.50	23	B										
10.00	24	D										
10.50-10.67		SPT	N=214*									
10.50-11.00	27	B									11.10	
11.10-12.00	28	B								Extremely to very weak red brown medium grained SANDSTONE.	(0.90)	
12.00-13.50											12.00	
12.00-12.08		SPT	N=375*	30	23	7	NI 60 100			Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar and undulating discontinuities.		
13.50-14.50				96	96	66	20 120 170					
14.50-16.00										. . . 14.50 to 14.70m with occasional angular flat fine to medium gravel of red brown mudstone.		
14.60		C		96	96	49	NI 80 140					
15.50		C								. . . Below 15.30m discontinuities mainly closely to medium spaced.		
16.00-17.50				98	98	83	NI 145 390					
16.80		C										
17.20		C										
17.50-19.00				100	98	92						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	drilled. 5. Rotary coring from 12.00m to 25.00m using water flush. 6. Installation as shown. 7. Cable percussion rig re-erected to complete installation and pull casing. 8. SPT hammer AR1862-2021 (E_r = 95.00%)

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**CBailey**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH103**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**21.07.21** End: **26.07.21**	**43.00**	**E:384345.0 N:398961.0**	**3** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
17.95		C								Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar and undulating discontinuities. *(stratum copied from 12.00m from previous sheet)*	(13.00)	
				100	98	92				. . . 18.35 to 18.30m core non intact recovered as coarse angular gravel sized fragments.		
19.00-20.50										. . . Below 19.00m more coarse sand size grains.		
				100	100	77						
19.80		C										
20.50-22.00												
				95	91	63	NI 145 390			. . . 20.95 to 21.00m with some medium sub rounded gravel of quartzite.		
22.00-23.50												
22.40		C								. . . 22.10 to 22.20m 45° rough undulating discontinuity.		
				100	97	70						
23.50-25.00												
24.17		C		100	100	90						
25.00		C								Borehole terminated at 25.00 m	25.00	

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**CBailey**	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		MEPC Ltd		BH103
Contract Ref:	Start: 21.07.21	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: 26.07.21	43.00	E:384345.0 N:398961.0	4 of 6

BH103 12.00-14.50m

21/07

22/07





BH103 14.50-17.50m

Method Used:	Cable Percussion + Rotary Cored	Plant Used:	Dando 2500 + Massenza M-I-3	Drilled By:	Robert Foster	Logged By:	CBailey	Checked By:	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		MEPC Ltd		BH103
Contract Ref:	Start: 21.07.21	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: 26.07.21	43.00	E:384345.0 N:398961.0	5 of 6

BH103 17.50-20.50m





BH103 20.50-23.50m

Method Used:	Cable Percussion + Rotary Cored	Plant Used:	Dando 2500 + Massenza M-I-3	Drilled By:	Robert Foster	Logged By:	CBailey	Checked By:	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH103**
Contract Ref:	Start: **21.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **26.07.21**	**43.00**	**E:384345.0 N:398961.0**	**6** of **6**

BH103 23.50-25.00m



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Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By:	**Robert Foster**	Logged By:	**CBailey**	Checked By:	AGS

STRUCTURAL SOILS

DRAFT

BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **29.07.21**	**44.40**	**E:384349.3 N:398986.7**	**1** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
0.10-0.40	1	B								MADE GROUND: Blackish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone quartz concrete and hardcore.	0.45	
0.10-0.40	101	ES										
0.50-0.80	2	B								Firm orangish brown sandy CLAY. Sand is fine to medium.	(0.55) 1.00	
1.00-1.20	3	B								Firm brown CLAY mottled grey present on fissures and frequent root traces.	1.20	
1.50-1.65		SPT	N=200*							Firm orangish brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse of sandstone and mudstone. Sand is fine to coarse. Low cobble content of sandstone.	(0.70) 1.90	
1.50-1.65	5	DSPT										
1.50-1.80	6	B										
2.00-2.50	7	B								Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine of sandstone quartz and mudstone.	(2.10) 4.00	
2.50-2.70		SPT	N=150*									
2.50-3.00	9	B										
3.50-3.83		SPT	N=83*									
3.50-3.83	11	DSPT										
3.50-4.00	12	B										
4.00-4.40	13	B								Very dense reddish brown sandy subrounded to rounded fine to coarse GRAVEL of various lithologies including quartzite sandstone.	(2.80) 6.80	
4.50-4.70		SPT	N=214*							. . . 4.50 to 4.60m driller records thin bed of slightly gravelly CLAY.		
4.50-4.70	15	DSPT										
4.50-5.00	16	B										
5.50	17	D										
6.00-6.21		SPT(c)	N=250*									
6.00-6.50	19	B										
6.80-7.30	20	B								Very dense orangish brown slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine of sandstone and quartz.	(1.70) 8.50	
7.50-7.85		SPT	N=75*									
7.50-7.85	22	DSPT										
7.50-8.00	23	B										
8.50-9.00	24	B								*Description on next sheet*		

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
22/07/21	18:08	1.20	None	200	Dry
23/07/21	08:05	1.20	None	200	Dry
23/07/21	14:00	5.30	5.30	200	5.20
26/07/21	09:59	5.30	5.30	200	Dry
26/07/21	17:33	13.80	13.50	150	10.50
27/07/21	08:05	13.80	13.50	150	13.10
27/07/21	17:57	22.58	22.50	150	14.10
28/07/21	08:00	22.50	22.50	150	15.10

Chiselling / Slow Progress

From	To	Duration (hh:mm)
4.50	5.30	03:00
5.30	6.00	01:00
6.00	6.80	01:00
14.20	15.00	01:00
15.00	16.50	01:30
21.90	22.50	01:15
22.58	24.00	01:30

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. Cable percussion drilling to 24.00m with 200mm and 150mm diameter casing and tools.
4. Stainless steel casing (3m lead lengths) used to allow UXO scan to be carried out as borehole is

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **29.07.21**	**44.40**	**E:384349.3 N:398986.7**	**2** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
9.00-9.30	25	UT100	150 blows 67% recovery							Very stiff brown slightly gravelly sandy CLAY. Gravel is subrounded to rounded fine of quartz, mudstone and sandstone. *(stratum copied from 8.50m from previous sheet)*	(3.00)	
9.50-10.00	26	B										
10.50-10.74		SPT	N=115*									
10.50-10.74	28	DSPT										
10.50-11.00	29	B										
											11.50	
11.50-12.00	30	B								Very dense reddish brown slightly gravelly fine to coarse SAND. Gravel is fine of quartz, sandstone and mudstone.		
12.00-12.15		SPT	N=200*									
12.00-12.15	32	DSPT										
12.00-12.50	33	B									(2.70)	
13.00	34	D										
13.50-13.80		SPT	N=100*									
13.50-13.80	36	DSPT										
13.50-14.00	37	B										
											14.20	
14.20-14.50	38	B								Very dense reddish brown fine to coarse SAND (driller records it as cemented sand)		
15.00-15.18		SPT	N=231*									
15.00-15.18	40	DSPT										
15.00-15.50	41	B										
16.00	42	D										
16.50-16.66		SPT	N=176*									
16.50-16.66	44	DSPT										
16.50-17.00	45	B										
17.50	46	D										

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth
28/07/21	12:21	24.07	22.50	150	16.20

Chiselling / Slow Progress

From	To	Duration (hh:mm)

General Remarks

drilled.
5. Rotary coring from 24.00m to 31.00m using water flush.
6. Installation as shown.
7. Cable percussion rig re-erected to complete installation and pull casing.
8. SPT hammer AR1862-2021 (E_r = 95.00%)

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **29.07.21**	**44.40**	**E:384349.3 N:398986.7**	**3** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
18.00-18.14		SPT	N=200*							Very dense reddish brown fine to coarse SAND (driller records it as cemented sand) *(stratum copied from 14.20m from previous sheet)*	(7.70)	
18.00-18.14	48	DSPT										
18.00-18.50	49	B										
19.00	50	D										
19.50-19.65		SPT	N=200*									
19.50-19.65	52	DSPT										
19.50-20.00	53	B										
20.50	54	D										
21.00-21.25		SPT	N=150*									
21.00-21.25	56	DSPT										
21.00-21.50	57	B									21.90	
22.00-22.50	58	D								Extremely weak to very weak reddish brown medium grained SANDSTONE.	(2.10)	
22.50-22.58		SPT	N=375*									
22.50-22.58	60	DSPT										
22.50-23.50	61	B									24.00	
24.00-25.00				85	84	25	NI 77 130			Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar and undulating discontinuities. . . . 24.55 to 24.70m with some angular fine gravel of quartzite and mudstone, occasional sub rounded coarse gravel of quartzite.		
24.00-24.07		SPT(c)	N=375*									
25.00-26.50				87	82	53	NI 130 370			. . . 25.55 to 26.50m ocassional angular fine and medium gravel of grey mudstone, sandstone and quartzite.		
25.40		C										
26.50-28.00				93	77	60						
26.80		C										

Boring Progress and Water Observations

Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress

From	To	Duration (hh:mm)

General Remarks

used.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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STRUCTURAL SOILS

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BOREHOLE LOG

Contract:	Client:	Borehole:
2 & 3 Angel Square	**MEPC Ltd**	**BH104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **29.07.21**	**44.40**	**E:384349.3 N:398986.7**	**4** of **6**

Depth (m)	Samples & Testing: No	Type	Results	Mechanical Log: TCR (%)	SCR (%)	RQD (%)	If (mm)	Backfill & Instrumentation	Water	Description of Strata	Depth (Thickness)	Material Graphic Legend
				93	77	60				. . . 26.90m single sub rounded coarse gravel of quartzite. Very weak to weak red brown medium to coarse grained SANDSTONE. Very closely to closely spaced sub horizontal rough planar and undulating discontinuities. *(stratum copied from 24.00m from previous sheet)*	(7.00)	
27.65		C										
28.00-29.50												
28.20		C								. . . 28.10 to 28.32m vertical, rough planar discontinuity.		
				91	83	77	NI 130 370					
										. . . 29.20 to 29.60m some sub rounded fine gravel of quartzite, mainly more coarse sand.		
29.50-31.00												
29.90		C										
				100	96	72						
										. . . 30.65 to 30.70m extremely closley spaced sub vertical and sub horizontal rough discontinuities, core is non intact.	31.00	
31.00		C								. . . 30.85 to 31.00m 80° rough planar discontiniuty.		
										Borehole terminated at 31.00 m		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable Percussion + Rotary Cored	**Dando 2500 + Massenza M-I-3**	**Robert Foster**	**IHayes**	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		MEPC Ltd		BH104
Contract Ref:	Start: 22.07.21	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: 29.07.21	44.40	E:384349.3 N:398986.7	5 of 6

BH104 24.00-26.50m

22/07/2021:
23/07/2021:
26/07/2021:
27/07/2021:
28/07/2021:
02/08/2021:





BH104 26.50-29.50m

Method Used:	Cable Percussion + Rotary Cored	Plant Used:	Dando 2500 + Massenza M-I-3	Drilled By:	Robert Foster	Logged By:	IHayes	Checked By:	

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BOREHOLE LOG

Contract:		Client:		Borehole:
2 & 3 Angel Square		**MEPC Ltd**		**BH104**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **29.07.21**	**44.40**	**E:384349.3 N:398986.7**	**6** of **6**

BH104 29.50-31.00m



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Method Used:	**Cable Percussion + Rotary Cored**	Plant Used:	**Dando 2500 + Massenza M-I-3**	Drilled By:	**Robert Foster**	Logged By:	**IHayes**	Checked By:	AGS

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STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **21.07.21**	**46.90**	**E:384402.9 N:399024.2**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							MADE GROUND: Weak to medium strong greyish black ASPHALT. Matrix is angular to subrounded fine to medium, 20-25% voids. (ROAD SURFACE)	0.10 (0.30)	
							MADE GROUND: Cream angular to subrounded fine to coarse sandy GRAVEL of limestone, occasional sandstone and quartz. (HARDCORE TYPE 1)	0.40	
							MADE GROUND: Light brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of sandstone and occasional concrete.	(0.75)	
	1.00	6	D					1.15	
	1.15	7	B				MADE GROUND: Dark brown mottled black gravelly clayey fine to coarse SAND of ash. Gravel is angular to subrounded of ash, brick.		
	1.20-1.65		SPT	N=9					
	1.20	1	DSPT						
1.00 - 2.00 (101mm dia) 90% rec	1.50	101	ES					(0.95)	
							. . . From 1.85m to 2.00m depth: Brick cobbles, angular to subrounded.		
	2.00-2.45		SPT	N=15				2.10	
	2.00	2	DSPT						
	2.10	8	B				MADE GROUND: Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse brick, occasional sandstone and mudstone.		
2.00 - 3.00 (89mm dia) 80% rec	2.50	102	ES						
	3.00-3.45		SPT	N=30				(1.85)	
	3.00	3	DSPT						
3.00 - 4.00 (79mm dia) 90% rec	3.40	9	B				. . . From 3.40m to 3.95m depth: Gravel content increases predominantly angular to subangular fine to medium of brick.		
	3.50	103	ES						
								3.95	
	3.95	10	D				Very stiff slightly sandy silty CLAY. (TILL)		
	4.00-4.45		SPT	N=39					
	4.00	4	DSPT						
4.00 - 4.75 (69mm dia)									

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)
21/07/21		2.30	-	89	

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.00m.
3. UXO scan carried out as hole drilled.
4. Water strike at 2.30 m depth
5. SPT refusal at 5.15 m depth.
6. Installed - GL to 1.00m plain - 1.00m to 4.00m slotted.
7. SPT hammer DART384-2021 (E_r = 76.00%) used.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**IHayes**	

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS101**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **21.07.21**	**46.90**	**E:384402.9 N:399024.2**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 4.75 (69mm dia)	4.95-5.28 4.95	5	SPT DSPT	N=86*			Very stiff slightly sandy silty CLAY. (TILL) *(stratum copied from 3.95m from previous sheet)*	(1.33)	
							Window sample hole terminated at 5.28m depth.	5.28	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**IHayes**	

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **21.07.21**	**47.20**	**E:384401.8 N:398986.7**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	1.00-1.45		SPT	N=7			MADE GROUND: Brownish cream very gravelly slightly clayey fine to coarse SAND. Gravel is angular to subrounded of limestone, sandstone and occasional quartz. (HARDCORE TYPE 1)	(0.35)	
								0.35	
	1.00	1	DSPT				MADE GROUND: Brownish black gravelly slightly clayey fine to coarse SAND of predominantly ash. Gravel is angular to subrounded fine to coarse of brick, ash, occasional sandstone and rare mudstone. Low cobble content, angular to subangular of brick.	(1.00)	
	1.00-1.35	101	ES						
	1.00-1.35	6	D						
1.00 - 2.00 (101mm dia) 100% rec	1.35-4.00	7	B					1.35	
	2.00-2.45		SPT	N=17			Very stiff brown slightly sandy slightly gravelly indistinctly laminated CLAY. Gravel rare angular to rounded fine to coarse of sandstone. (TILL)		
	2.00	2	DSPT						
2.00 - 3.00 (89mm dia) 100% rec									
	3.00-3.45		SPT	N=19				(3.70)	
	3.00	3	DSPT						
3.00 - 4.00 (79mm dia) 100% rec									
	4.00-4.45		SPT	N=21					
	4.00	4	DSPT						
4.00 - 4.80 (69mm dia) 100% rec									

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.00m.
3. UXO scan carried out as hole drilled.
4. Installed with 50mm standpipe - slotted GL to 1.00m.
5. SPT hammer DART384-2021 (E_r = 76.00%) used.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**IHayes**	AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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STRUCTURAL SOILS

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS102**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **21.07.21**	**47.20**	**E:384401.8 N:398986.7**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 4.80 (69mm dia) 100% rec	4.80-5.03 4.80	5	SPT DSPT	N=200*			Very stiff brown slightly sandy slightly gravelly indistinctly laminated CLAY. Gravel rare angular to rounded fine to coarse of sandstone. (TILL) *(stratum copied from 1.35m from previous sheet)*	5.05	
							Window sample hole refused at 5.05m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**lHayes**	AGS

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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STRUCTURAL SOILS

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS103**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **22.07.21**	**44.55**	**E:384367.0 N:398992.4**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							MADE GROUND: Grey and cream fine to coarse SAND and angular to subrounded fine to coarse GRAVEL of limestone, concrete and sandstone. (HARDCORE)	0.10	
	0.20	1	D				MADE GROUND: Black gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of ash and occasional sandstone and concrete.	0.35	
	0.20	101	ES						
	0.40	102	ES						
	0.40	2	D				Firm to stiff brown occasionally mottled dark brown slightly sandy silty CLAY with occasional pockets of silt. 20-50mm diameter. (TILL)		
	1.00-2.00	5	B						
1.20 - 2.00 (101mm dia) 100% rec	1.20-1.65		SPT	N=15			. . . From 1.00m to 2.40m depth: Firm to stiff slightly gravelly dark brown slightly sandy CLAY with indistinct laminations and closely spaced partings of silt. Gravel is angular to rounded fine to coarse of sandstone, occasional quartz and mudstone.	(2.10)	
	1.20	3	DSPT						
	2.00-2.45		SPT	N=51*					
	2.00	4	DSPT						
							Window sample hole terminated at 2.45m depth.	2.45	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. UXO scan carried out as hole drilled.
4. SPT refusal at 2.40 m depth.
5. Installed with standpipe - slotted GL to 1.00m, bentonite backfill 1.00m to 2.40m.
6. SPT hammer DART384-2021 (E_r = 76.00%) used.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**IHayes**	AGS

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STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS104**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**45.20**	**E:384367.0 N:398943.7**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.25-0.60	2	B				MADE GROUND: Cream and grey fine to coarse SAND and angular to subrounded fine to coarse GRAVEL of limestone and occasional concrete. (HARDCORE)	0.25	
	0.30	1	D				MADE GROUND: Black gravelly fine to coarse SAND of ash. Gravel is angular to subrounded fine to coarse of ash.	(0.35)	
	0.30	101	ES					0.60	
	0.60-1.20	4	B				Stiff to very stiff dark brown slightly sandy slightly gravelly indistinctly laminated CLAY. Gravel is angular to rounded fine to coarse of sandstone and mudstone. (TILL)		
	0.70	102	ES						
	0.70	3	D						
	1.00-1.45		SPT	N=12					
1.00 - 2.00 (101mm dia) 100% rec	1.00-2.00	8	B						
	2.00-2.45		SPT	N=12			. . . At 2.00m depth: Dark brown very stiff.	(2.80)	
2.00 - 3.00 (89mm dia) 100% rec	2.00-3.00	9	B						
	3.00-3.38		SPT	N=67*				3.40	
							Window sample hole terminated at 3.40m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.00m.
3. UXO scan carried out as hole drilled.
4. Installed with standpipe - slotted GL to 1.00m, bentonite backfill 1.00m to 3.40m.
5. SPT hammer DART384-2021 (E_r = 76.00%) used.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Archway Dart 383**	**???**	**lHayes**	AGS

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WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS105**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **22.07.21**	**41.70**	**E:384311.3 N:398964.5**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							MADE GROUND: Grass over black gravelly fine to coarse SAND of ash. Gravel is angular to subrounded fine to coarse of ash, occasional concrete and brick. Low cobble content, angular to subangular of brick.	(2.80)	
1.00 - 2.00 (89mm dia) 100% rec	1.00-1.45 1.00 1.00-1.50 1.00-2.70	 1 101 8	SPT DSPT ES B	N=18					
2.00 - 2.70 (79mm dia) 100% rec	2.00-2.45 2.00	 2	SPT DSPT	N=39					
2.70 - 4.00 (69mm dia) 100% rec	2.70-3.15 2.70 2.80-3.50	 3 7	SPT DSPT D	N=33				2.80	
							MADE GROUND: Soft to firm brown sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of brick, sandstone, quartz and occasional concrete.	(0.70)	
	3.50-4.65	9	B				MADE GROUND: Orangish brown mottled yellow slightly gravelly fine to coarse SAND. Gravel is subangular to rounded of quartz, brick, sandstone and mudstone.	3.50	
4.00 - 5.00 (69mm dia) 100% rec	4.00-4.45 4.00-4.65 4.00	 102 4	SPT ES DSPT	N=22				(1.15)	

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Scanned with CAT and Genny before breaking ground.
2. Hand dug pit to 1.20m.
3. UXO scan carried out as hole drilled.
4. Installed with 1.00m plain pipe, slotted pipe 1.00m - 4.00m, bentonite backfill 4.00m to 5.45m.
5. SPT hammer DART384-2021 (E_r = 76.00%) used.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**IHayes**	AGS

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STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
2 & 3 Angel Square	**MEPC Ltd**	**WS105**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**22.07.21** End: **22.07.21**	**41.70**	**E:384311.3 N:398964.5**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (69mm dia) 100% rec								4.65	
	5.00-5.45 5.00	5	SPT DSPT	N=16			Orangish brown gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of sandstone, mudstone and quartz. (TILL)	(1.80)	
5.00 - 6.00 (59mm dia) 0% rec									
	6.00-6.45 6.00	6	SPT DSPT	N=35				6.45	
							Window sample hole terminated at 6.45m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Inspection pit + Tracked window	**Archway Dart 383**	**???**	**lHayes**	

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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP101**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**47.00**	**E:384421.7 N:399019.0**	**1** of **2**

Description of strata by stratum code and associated diagrams

Stratum code	Stratum description
a	MADE GROUND: Light brown very sandy medium to coarse angular GRAVEL of limestone.
b	MADE GROUND: Dark grey very sandy fine to coarse angular to sub rounded GRAVEL with whole and half bricks. Gravel is mainly sandstone and brick fragments, with some fragments of glass, plastic and pottery.

...Bricks more frequent with depth.

…...0.90 - 1.20 m earthenware drain pipe.

Southern end
0.10-0.90m: MADE GROUND: Mass concrete block, reinforcment bar protruding from top of block.

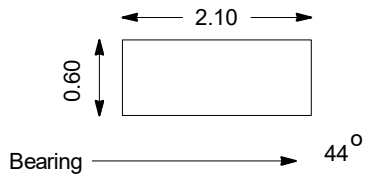
.....25 mm diameter vertical pipe in south west corner.

Central and northern end
0.50-2.20m: MADE GROUND: Sandstone blocks, presumed masonary wall

…..0.50-2.20 m masonary wall visible in west face of trial pit.
…..0.50-1.30 m brick wall visible in east face of trial pit.
…..1.30-2.20 m masonary wall visible in east face of trial pit.

c	MADE GROUND: Bricks, presumed to be a brick floor.
d	Firm to stiff brown slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite. Fissures are closely spaced.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.20m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

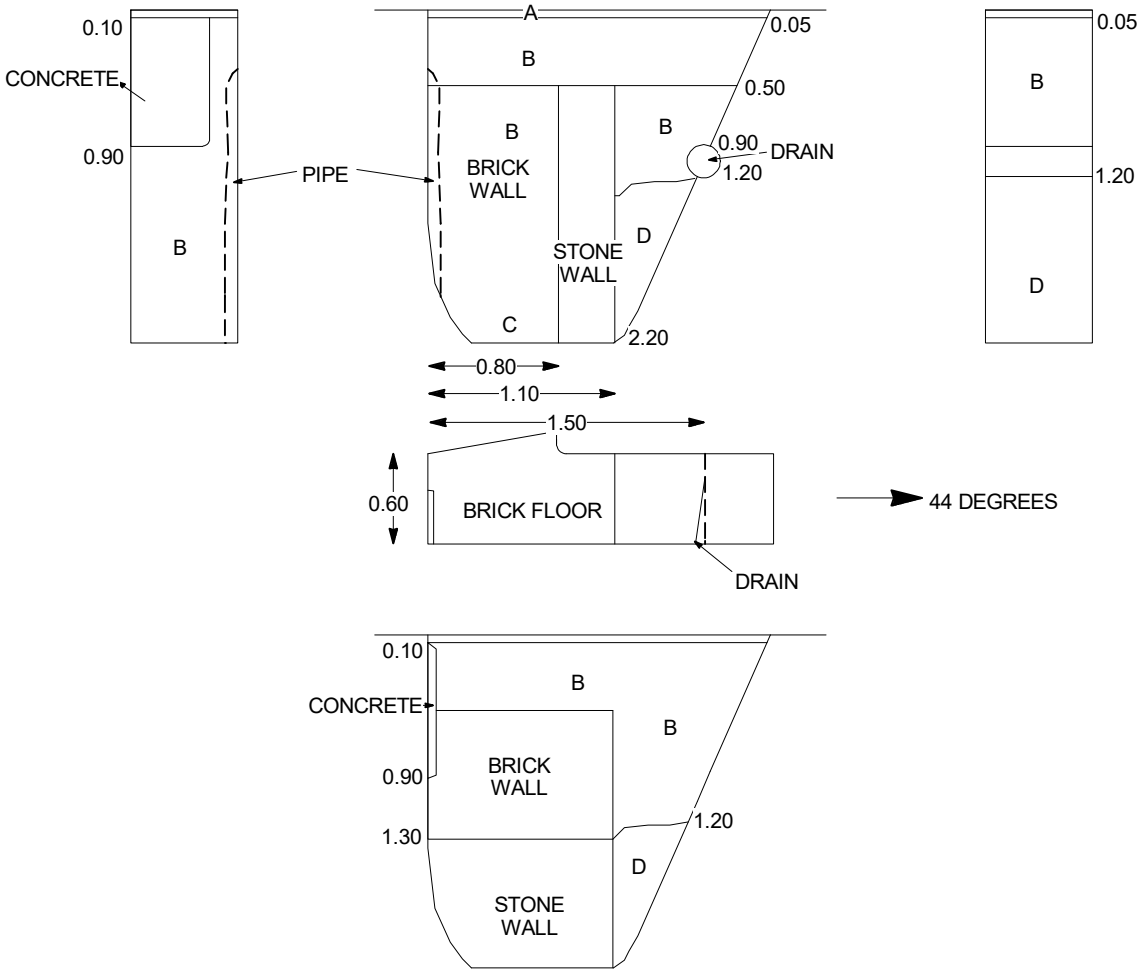
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log X1 - TP LOG - LOGGED BY STRATUM - A4 | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP101**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**47.00**	**E:384421.7 N:399019.0**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP102**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**47.10**	**E:384410.5 N:399004.2**	**1** of **2**

Description of strata by stratum code and associated diagrams

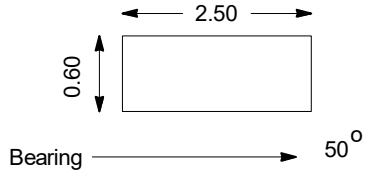
Stratum code	Stratum description
a	MADE GROUND: Brown slightly clayey very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments.
b	MADE GROUND: Brown slightly clayey very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments. Medium cobble content of mainly brick fragments (upto half bricks).
c	MADE GROUND: Angular blocks of sandstone 200mm x 200mm x 200mm. Presumed former road surface?

…..0.50-0.70 m line of blocks visible in east face of trial pit.

…..0.40-0.90 m brick wall visible in west face of trial pit.

d	MADE GROUND: Dark brown very sandy fine to coarse angular GRAVEL of mainly sandstone fragments. Some sand size ash.
e	POSSIBLE MADE GROUND: Very stiff brown occassinally mottled grey slightly gravelly CLAY. Gravel is fine to medium angular of brick fragments. Reworked material.
f	Very stiff fissured thinly bedded brown occasionally mottled grey along bedding and fissures slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite. Fissures are closely spaced.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 1.60m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

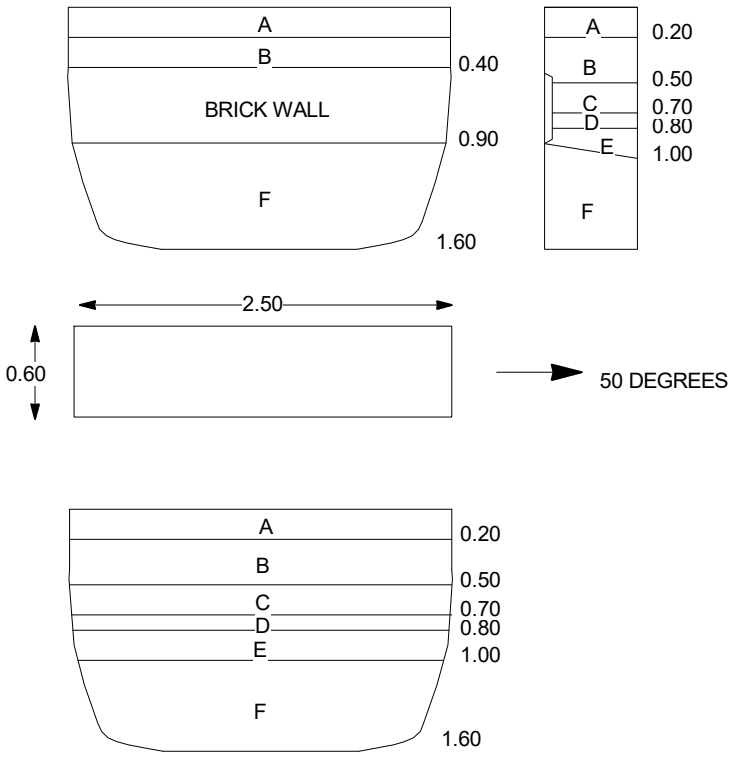
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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP102**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**47.10**	**E:384410.5 N:399004.2**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP103**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.70**	**E:384411.5 N:399026.5**	**1** of **2**

Description of strata by stratum code and associated diagrams

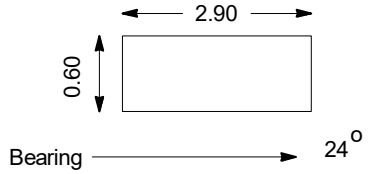
Stratum code	Stratum description
a	MADE GROUND: Light brown very sandy medium to coarse angular GRAVEL of limestone.
b	MADE GROUND: Brown very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments. Medium cobble content of mainly brick fragments (upto half bricks).

…...gravel seen to extend down to 1.70 m in west side of pit.

c	MADE GROUND: Bricks, presumed to be a brick foundation.

…..1.05 - 1.70 m brick wall visible in west face of trial pit.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 1.70m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

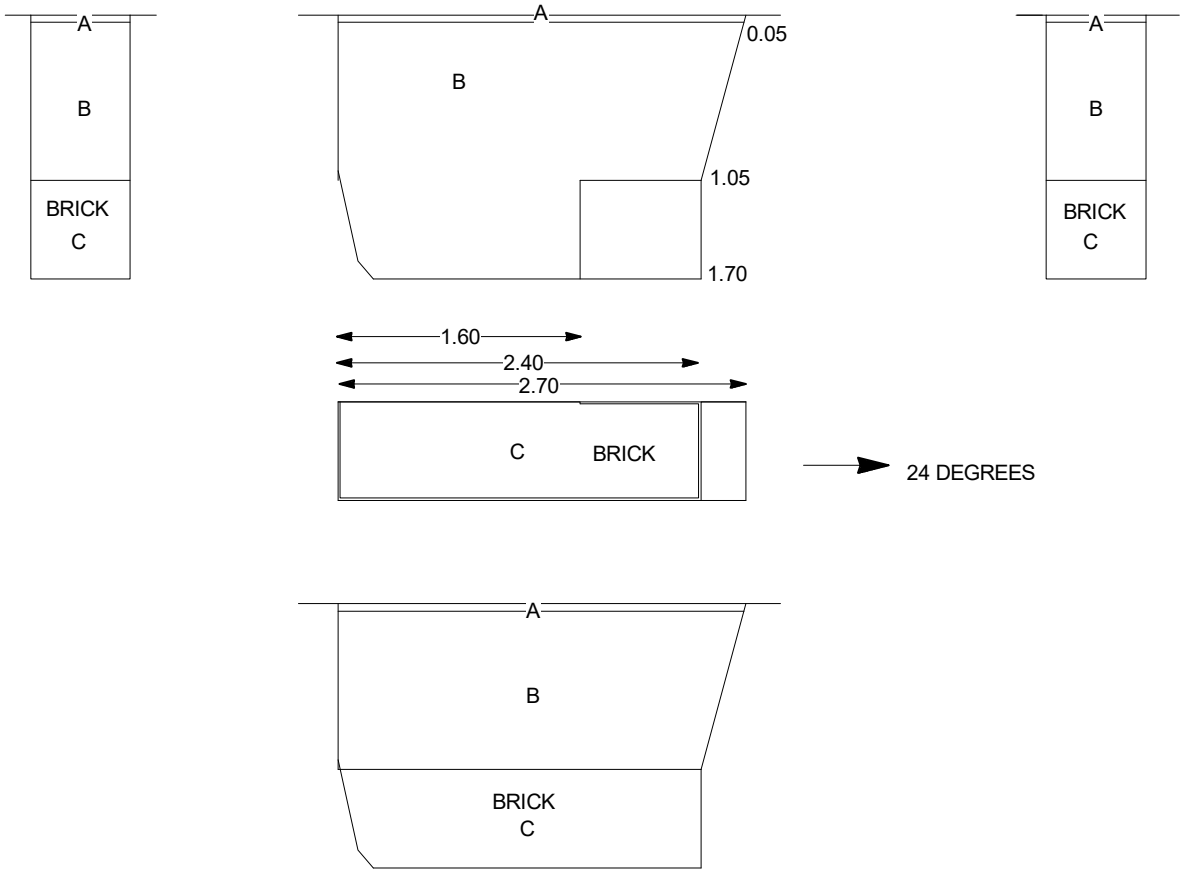
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log X1 - TP LOG - LOGGED BY STRATUM - A4 | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP103**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.70**	**E:384411.5 N:399026.5**	**2** of **2**



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Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP104**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.85**	**E:384391.6 N:399013.5**	**1** of **2**

Description of strata by stratum code and associated diagrams

Stratum code	Stratum description
a	MADE GROUND: Light brown very sandy medium to coarse angular GRAVEL of limestone.
b	MADE GROUND: Dark brown brown slightly clayey very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments. Whole and half bricks become more frequent with depth.

…...0.05m metal manhole cover.

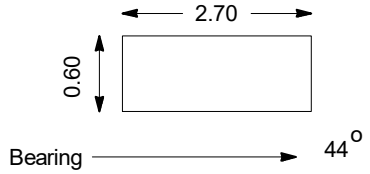
…...0.05-0.80m 2 x sandstone flags 70 mm x 200 x 300 m.

c	MADE GROUND Dark brown slightly clayey SAND and GRAVEL. Sand is firn to coarse, Gravel is fine to coarse angular to sub angular of mainly sandstone and brick fragments, some fragments of pottery and coal.
d	Very stiff fissured thinly bedded brown occasionally mottled grey along bedding and fissures slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite. Fissures are closely spaced.

…...below 0.50 m brick wall visible in southern end of pit.

…...below 0.05 m light grey medium angular gravel exposed at northern end presumably surround to drain or duct. Pit dug between exposed gravel and wall.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.10m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

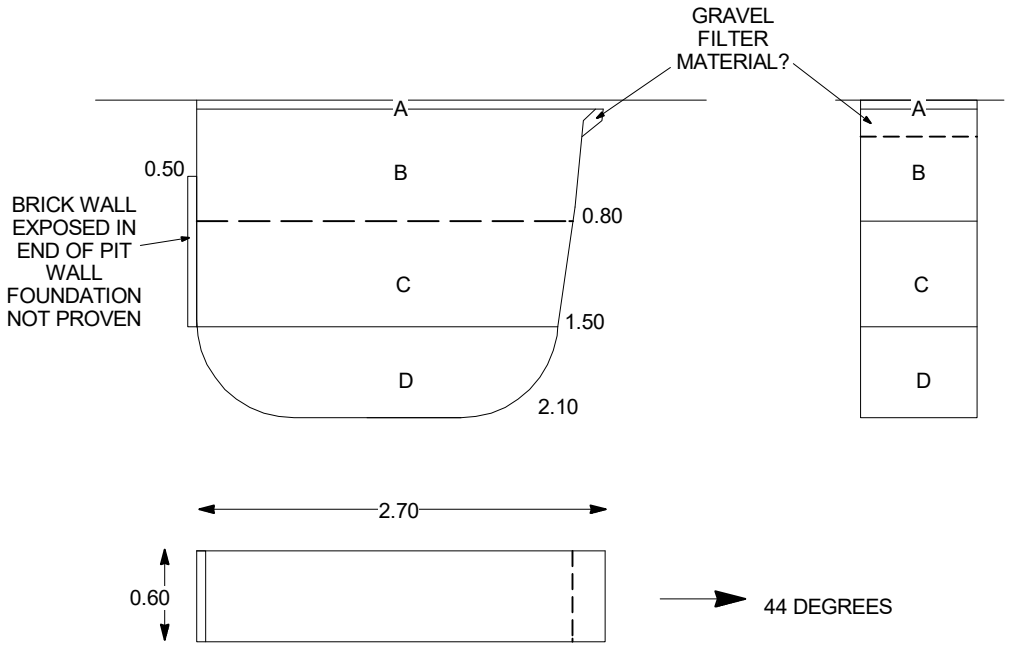
GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log X1 - TP LOG - LOGGED BY STRATUM - A4 | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP104**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.85**	**E:384391.6 N:399013.5**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log X1 - TP LOG - LOGGED BY STRATUM - A4 | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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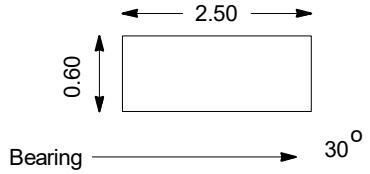
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP105**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.50**	**E:384381.1 N:398982.6**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.05	1	B				MADE GROUND: Light brown very sandy medium to coarse angular GRAVEL of limestone.	0.10	
0.05	101	ES				MADE GROUND: Dark brown slightly clayey very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments. Medium cobble content of mainly brick fragments (whole and half bricks). . . . 0.10m: geotextile.	(0.80)	
0.30	102	ES						
0.30	2	B					0.90	
0.85	103	ES				Very stiff fissured very thinly to thinly bedded brown occasionally mottled grey along bedding and fissures slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite, some angular gravel of coal. Fissures are very closely to closely spaced. Medium to coarse to sand on some bedding planes.	(0.60)	
0.85	3	B						
1.00		V	c_u=>130/>130					
1.20	104	ES						
1.20	4	B						
1.20	5	D					1.50	
1.50	6	B				Trial pit terminated at 1.50m depth.		
1.50	7	D						

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 1.50m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

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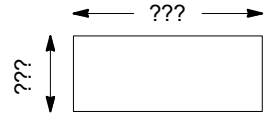
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP106**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**21.07.21** End: **21.07.21**	**44.45**	**E:384357.3 N:398996.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	D				MADE GROUND: Weak black ASPHALT. Matrix is angular to subrounded fine to medium. Voids of 25-30%	(0.62)	
							0.62	
0.70	4	D				MADE GROUND: Stiff brown slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of mudstone, sandstone and quartz.	0.70	
						MADE GROUND: Light grey slightly sandy gravelly subangular to subrounded COBBLES of brick and sandstone. sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone, quartzite, brick and tarmacadam.	(0.92)	
							1.62	
1.70	6	D				Reddish brown slightly gravelly slightly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of quartz. Low cobble content. Assessed as very dense sand.	(0.48)	
							2.10	
						Trial pit terminated at 2.10m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.10m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**CBailey**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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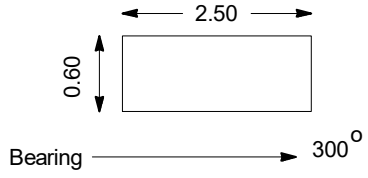
TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP107**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**44.20**	**E:384354.0 N:398930.2**	**1** of **2**

Description of strata by stratum code and associated diagrams

Stratum code	Stratum description
a	MADE GROUND: Tarmac
b	MADE GROUND: Brown very sandy fine to coarse angular GRAVEL of mainly sandstone. Medium cobble content of mainly brick fragments (whole and half bricks).
c	MADE GROUND: Tarmac
d	MADE GROUND: Light brown very sandy fine to coarse angular GRAVEL of mainly sandstone some brick fragments. Occasional whole and half bricks.
e	MADE GROUND: Angular cobbles and boulders, of sandstone and brick with fines. Fines comprise light brown very sandy fine to coarse angular gravel of sandstone and brick fragments.
f	MADE GROUND: Concrete, coarse gravel size aggregate including brick fragments up to half bricks.
g	MADE GROUND: Brick rubble, whole and half bricks.
…...base of the made ground becomes deeper in the central eastern end of pit, proved to 1.80 m on the north side and 2.00 m on the south side.	
…...below 0.95 m brick walls exposed in eastern end of pit in both the north and south faces and at the end.	
h	Stiff fissured very thinly to thinly bedded brown occasionally mottled grey along bedding and fissures slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite. Fissures are very closely to closely spaced. Fine to medium sand on some bedding planes.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.50m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

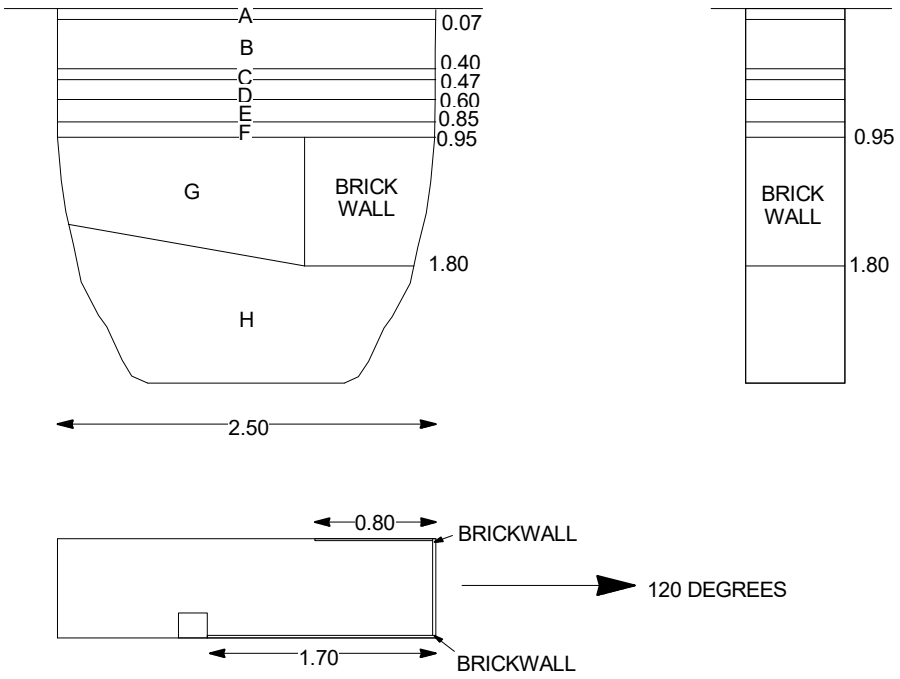
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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP107**
Contract Ref:	Start: **22.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**44.20**	**E:384354.0 N:398930.2**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

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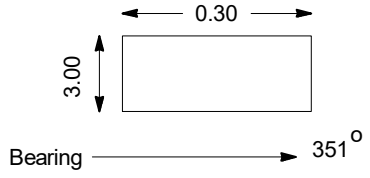
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP108**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **20.07.21**	**44.60**	**E:384358.0 N:398969.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	D				MADE GROUND: Grey sandy angular to subangular fine to coarse GRAVEL of limestone and concrete.	0.25	
0.25-0.55	3	B				MADE GROUND: Cream sandy gravelly angular to subrounded COBBLES of sandstone.	(0.30)	
0.30	2	D					0.55	
0.55-0.85	5	B				. . . Possible brick foundations encountetered in southern end of trial pit at 0.50m.		
0.60	101	ES				MADE GROUND: Black very gravelly fine to coarse SAND of ash. Gravel is angular to subrounded fine to coarse of ash, occasional brick and concrete.	(0.30)	
0.60	4	D					0.85	
0.85-1.25	7	B				Stiff very thinly bedded brown mottled grey on bedding CLAY with fine sand / silt on bedding. Very occasional fine angular gravel of coal.		
0.90	102	ES					(0.40)	
0.90	6	D					1.25	
1.25-1.85	9	B				Very stiff dark brown mottled grey slightly sandy CLAY with indistinct laminations, some grey mottling on laminations.		
1.30	103	ES						
1.30	8	D					(1.05)	
1.85-2.30	11	B				. . . 1.85m - 2.30m: slightly gravelly with low cobble content. Cobbles subrounded to rounded of mudstone. Gravel subrounded to rounded fine to coarse of mudstone and sandstone.		
2.00	10	D					2.30	
2.30-2.50	13	B				Orangish brown gravelly silty fine to medium SAND. Gravel is subangular to rounded fine to coarse of sandstone and occasional mudstone and quartz. Assessed as dense sand.	2.50	
2.35	12	D				Trial pit terminated at 2.50m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.50m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**IHayes**	

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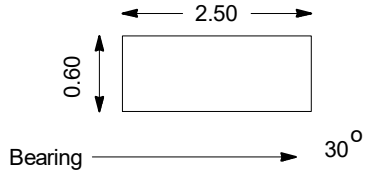
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP109**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **22.07.21**	**46.20**	**E:384345.0 N:398956.9**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Light brown very sandy medium to coarse angular GRAVEL of limestone.	0.25	
0.20	1	B						
0.20	101	ES				MADE GROUND: Brown slightly clayey very sandy fine to coarse angular GRAVEL of mainly sandstone and brick fragments. Medium cobble content of mainly brick fragments (up to half bricks).	0.40	
0.30	102	ES						
0.30	2	B				POSSIBLE MADE GROUND: Very stiff brown occassionally mottled grey slightly gravelly CLAY. Gravel is fine to medium angular of brick fragments. Reworked material.	0.60	
0.50	103	ES						
0.50	3	B						
0.60		V	c_u=>130/>130			Very stiff fissured thinly bedded brown occasionally mottled grey along bedding and fissures slightly gravelly CLAY. Gravel is fine to medium sub rounded of quartzite. Fissures are closely spaced.	(0.90)	
1.20	104	ES						
1.20	4	B						
1.20	5	D					1.50	
						Trial pit terminated at 1.50m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 1.50m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

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TRIAL PIT LOG

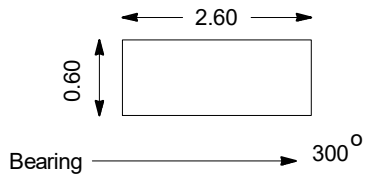
Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP110**
Contract Ref:	Start: **20.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **20.07.21**	**44.40**	**E:384342.1 N:398981.4**	**1** of **2**

Description of strata by stratum code and associated diagrams

Stratum code	Stratum description
a	MADE GROUND: Brown sandy slightly clayey fine to coarse angular GRAVEL of mainly sandstone.
b	MADE GROUND: Light brown angular COBBLE and BOULDER with fines. Fines comprise light brown sandy fine to coarse angular GRAVEL of mainly sandstone. Cobbles and boulders of sandstone up to 100mm x 150mm x 200mm.
c	MADE GROUND: Firm to stiff brown sandy CLAY with fragments of timber and half bricks. Some dark grey discoluration in places.
d	MADE GROUND: Firm brown gravelly CLAY. Gravel is fine to coarse angular of brick and sandstone fragments, with some fragments of tarmac along boundaries.
e	Possible MADE GROUND: Stiff brown slightly gravelly CLAY with some partings of fine and medium sand.

…...at western edge becomes very sandy.

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 1.50m depth.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

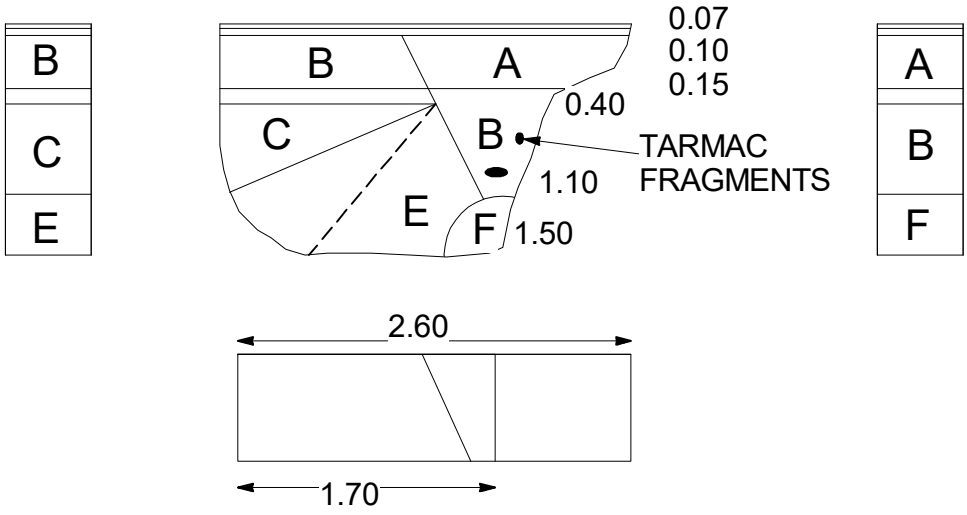
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STRUCTURAL SOILS

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TRIAL PIT LOG

Contract:		Client:		Trial Pit:
2 & 3 Angel Square		**MEPC Ltd**		**TP110**
Contract Ref:	Start: **20.07.21**	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **20.07.21**	**44.40**	**E:384342.1 N:398981.4**	**2** of **2**



Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log X1 - TP LOG - LOGGED BY STRATUM - A4 | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
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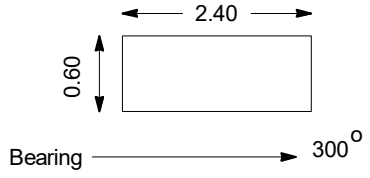
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP110A**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**20.07.21** End: **20.07.21**	**44.40**	**E:384340.1 N:398979.4**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Tarmac	0.07	
						MADE GROUND: Brown sandy slightly clayey fine to coarse angular GRAVEL of mainly sandstone.	0.10 / 0.15	
						MADE GROUND: Tarmac	0.30	
						MADE GROUND: Brown sandy slightly clayey fine to coarse angular GRAVEL of mainly sandstone.	0.31	
						MADE GROUND: Concrete . . . 0.30-3.20m: the chamber is of brick construction with metal rungs in wall		
						Partially open entrance to a chamber. Metal cover visible in the excavation side. Chamber dipped to 2.90 m below concrete level 3.20m below ground level.	(2.89)	
						Trial pit terminated at 0.31m, base of chamber probed to 3.20m depth.	3.20	

Plan (Not to Scale)



General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**Tracked excavator**	**JMcCarthy**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 29/09/21 - 20:37 | JM2 |

STRUCTURAL SOILS

DRAFT

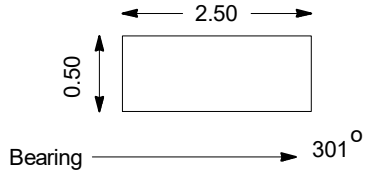
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP111**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	End: **21.07.21**	**42.50**	**E:384324.8 N:398955.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Weak greyish black ASPHALT. Matrix is angular to subrounded fine to medium ~20-25% voids	0.10	
0.20	1	D				MADE GROUND: Brown slightly clayey gravelly fine to coarse SAND with high cobble content angular to subangular of brick and occasionally concrete. Frequent metal fragments cotton reels and plastic sheeting.		
0.20	101	ES						
0.20-1.00	2	LB				. . . 0.50m: gravel angular to subrounded fine to coarse of brick occasionally concrete sandstone and quartz		
1.00	102	ES						
1.00	3	D						
							(3.40)	
1.80	103	ES						
1.80	4	D						
1.80-2.70	5	LB				. . . 2.00m: gravel becoming subrounded predominantly.		
						. . . Potential brick floor/basement.		
2.70	104	ES						
2.70	6	D						
							3.50	
						Trial pit terminated at 3.50m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Trial pit sides stable whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 3.50m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**IHayes**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 29/09/21 - 20:37 | JM2 |

STRUCTURAL SOILS

DRAFT

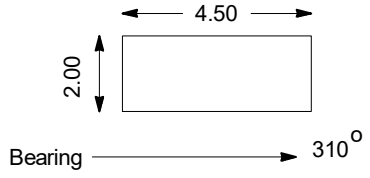
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
2 & 3 Angel Square	**MEPC Ltd**	**TP112**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
765325	**23.07.21** End: **23.07.21**	**41.70**	**E:384311.3 N:398968.3**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						HARDCORE: light grey sandy angular to subangular fine to coarse GRAVEL. Sand is fine to coarse.	0.20	
						ASPHALT: Black matric is angular to subangular fine to medium. Matrix 30%	0.28	
						MADE GROUND: light brown sandy angular to subangular fine to coarse GRAVEL of brick hardcore sandstone and wood. Low cobble content of brick and sandstone. Frequent fabric content and low boulder content or concrete.	(0.80)	
							1.08	
						MADE GROUND: blackish brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of brick sandstone quartz low cobble content or brick and low fabric content.	(1.22)	
							2.30	
						Trial pit terminated at 2.30m depth.		

Plan (Not to Scale)



General Remarks

1. Excavation location scanned with GPR and CAT and Genny prior to excavation.
2. Trial pit dry whilst excavating.
3. Partial collapse of sides whilst excavating.
4. On completion, backfilled with arisings and compacted aggregate.
5. Trial pit terminated at 2.30m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**CBailey**	

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 765325-2-AND-3-ANGEL-SQUARE.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 29/09/21 - 20:37 | JM2 |

Appendix B Updated Risk Assessment

B.1 Chemical test results

B.2 Updated Risk Assessment

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calculated SOM	6.29
SOM used for threshold	1%

Project:	2 & 3 Angel Square
Project Number	43434
Date:	Aug-2021

N/A = no screening criteria available

Screening criteria: **C4SL**/S4UL

		Residential with	Residential with	Commercial
Cyanide	mg/kg	4.6	760	16000
Free Cyanide	mg/kg	4.6	760	16000
Arsenic	mg/kg	**37**	**40**	**640**
Barium	mg/kg	*N/A*	*N/A*	*N/A*
Beryllium	mg/kg	1.7	1.7	12
Boron	mg/kg	290	11000	240000
Cadmium	mg/kg	**26**	**149**	**410**
Chromium	mg/kg	910	910	8600
Chromium VI	mg/kg	**21**	**21**	**49**
Copper	mg/kg	2400	7100	68000
Lead	mg/kg	**200**	**310**	**2330**
Mercury (elemental)	mg/kg	1.2	1.2	58
Mercury (inorganic)	mg/kg	40	56	58
Nickel	mg/kg	130	180	980
Selenium	mg/kg	250	430	12000
Vanadium	mg/kg	410	1200	9000
Zinc	mg/kg	3700	40000	730000
TPH	mg/kg	490	490	38000
Benzene	mg/kg	0.087	0.38	27
Toluene	mg/kg	130	869	869
Ethyl Benzene	mg/kg	47	83	518
m/p Xylenes	mg/kg	56	79	576
o Xylenes	mg/kg	60	88	478
Xylenes	mg/kg	56	79	576
MTBE	mg/kg	*N/A*	*N/A*	*N/A*
Naphthalene	mg/kg	2.3	2.3	190
Acenaphthylene	mg/kg	170	2900	83000
Acenaphthene	mg/kg	210	3000	84000
Fluorene	mg/kg	170	2800	63000
Phenanthrene	mg/kg	95	1300	22000
Anthracene	mg/kg	2400	31000	520000
Fluoranthene	mg/kg	280	1500	23000
Pyrene	mg/kg	620	3700	54000
Benzo[a]anthracene	mg/kg	7.2	11	170
Chrysene	mg/kg	15	30	350
Benzo[b]fluoranthene	mg/kg	2.6	3.9	44
Benzo[k]fluoranthene	mg/kg	77	110	1200
Benzo[a]pyrene	mg/kg	2.2	3.2	35
Indeno[123-cd]pyrene	mg/kg	27	45	500
Dibenzo[ah]anthracene	mg/kg	0.24	0.31	3.5
Benzo[ghi]perylene	mg/kg	320	360	3900
Total USEPA 16 PAHs	mg/kg	*N/A*	*N/A*	*N/A*
Aliphatic C5 - C6	mg/kg	42	42	3200
Aliphatic C6 - C8	mg/kg	100	100	7800
Aliphatic C8 - C10	mg/kg	27	27	2000
Aliphatic C10 - C12	mg/kg	130	130	9700
Aliphatic C12 - C16	mg/kg	1100	1100	59000
Aliphatic C16 - C21	mg/kg	65000	65000	1600000
Aliphatic C21 - C35	mg/kg	65000	64000	1600000
Total Aliphatic	mg/kg	*N/A*	*N/A*	*N/A*
Aromatic C5 - C7	mg/kg	70	370	26000
Aromatic C7 - 8	mg/kg	130	860	56000
Aromatic C8 - C10	mg/kg	34	47	3500
Aromatic C10 - 12	mg/kg	74	250	16000
Aromatic C12 - C16	mg/kg	140	1800	36000
Aromatic C16 - C21	mg/kg	260	1900	28000
Aromatic C21 - C35	mg/kg	1100	1900	28000
Total Aromatic	mg/kg	1100	1900	28000
Total Aliphatic and Aromatic	mg/kg			

	MG / NG	MG	MG	MG	MG	MG	MG	MG	MG		MG	MG	MG	MG	MG
	Sample ID	TP103	TP104	TP107	TP108	TP111	TP102	BH104	WS105	WS105	WS104	WS102	WS101	TP108	TP101
	Depth	0.8	0.5	0.6	0.6	1.8	0.7	0.1	1	4	0.3			0.8	0.7
	Units														
pH	pH units	8.51	7.96	9.03	8.67	8.27	8.11	8.37	9.88	9.31	9.28				
SOM	%	3.3	6.9	0.3	19.8	4.5	9.4	14	1.9	1.7	1.1				
Moisture	%	11.2	9.4	2.2	13.6	11.4	11.6	13.2	14.6	7.5	13.4				
TOC	%														
Asbestos Screen	D/ND	ND	ND	ND	Chrysotile	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Asbestos Quantification	%				0.003										
Cyanide	mg/kg														
Free Cyanide	mg/kg														
Arsenic	mg/kg	8	14	1	13	17	15	19	5	4	2				
Barium	mg/kg														
Beryllium	mg/kg														
Boron	mg/kg														
Cadmium	mg/kg	1.4	1.1	0.5	1	0.9	2.5	0.8	0.6	0.5	0.9				
Chromium	mg/kg	18	21				16	16	19	12	20				
Chromium VI	mg/kg														
Copper	mg/kg	96	139	7	61	107	299	36	75	53	22				
Lead	mg/kg	169	5910	142	109	4300	1060	23	258	124	11				
Mercury (elemental)	mg/kg	0.71	1.32	1.75	1.34	0.66	0.77	0.28	0.49	0.17	0.17				
Mercury (inorganic)	mg/kg	0.71	1.32	1.75	1.34	0.66	0.77	0.28	0.49	0.17	0.17				
Nickel	mg/kg	25	28	13	31	22	31	26	10	12	26				
Selenium	mg/kg	1	1	1	1	1	1	1	1	1	1				
Vanadium	mg/kg														
Zinc	mg/kg	200	267	13	171	229	1580	23	124	80	48				
TPH	mg/kg														
Benzene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Toluene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Ethyl Benzene	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
m/p Xylenes	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
o Xylenes	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Xylenes	mg/kg														
MTBE	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Naphthalene	mg/kg	0.04	0.03	0.03	0.19	0.03	3.25	1.55	0.13	0.1	0.03				
Acenaphthylene	mg/kg	0.02	0.04	0.01	0.02	0.03	0.06	0.03	0.01	0.03	0.01				
Acenaphthene	mg/kg	0.28	0.13	0.01	0.57	0.15	4.81	1.89	0.2	0.26	0.01				
Fluorene	mg/kg	0.19	0.09	0.01	0.3	0.1	3.14	1.62	0.13	0.16	0.01				
Phenanthrene	mg/kg	1.91	1.19	0.03	2.67	1.34	21.2	10.6	1.04	1.86	0.07				
Anthracene	mg/kg	0.44	0.28	0.02	0.61	0.3	4.13	2.94	0.24	0.48	0.02				
Fluoranthene	mg/kg	3.2	3.55	0.08	2.97	2.52	14.9	9.67	1.2	2.96	0.1				
Pyrene	mg/kg	3.07	3.9	0.07	2.87	2.37	13	8.56	1.16	2.96	0.1				
Benzo[a]anthracene	mg/kg	1.6	1.9	0.04	1.46	1.2	5.06	4.45	0.61	1.43	0.05				
Chrysene	mg/kg	1.63	2.11	0.06	1.49	1.2	4.8	3.9	0.6	1.5	0.06				
Benzo[b]fluoranthene	mg/kg	1.67	2.03	0.05	1.11	1.14	4.31	3.28	0.68	2.15	0.05				
Benzo[k]fluoranthene	mg/kg	0.6	0.58	0.07	0.44	0.42	1.6	1.31	0.26	0.82	0.07				
Benzo[a]pyrene	mg/kg	1.63	1.86	0.04	1.11	1.11	4.14	3.15	0.63	1.93	0.04				
Indeno[123-cd]pyrene	mg/kg	0.95	1.24	0.03	0.58	0.68	2.11	1.31	0.37	1.12	0.03				
Dibenzo[ah]anthracene	mg/kg	0.2	0.25	0.04	0.14	0.14	0.44	0.32	0.07	0.23	0.04				
Benzo[ghi]perylene	mg/kg	0.87	1.14	0.05	0.53	0.63	1.92	1.12	0.35	1.06	0.05				
Total USEPA 16 PAHs	mg/kg	18.3	20.3	0.08	17.1	13.3	88.9	55.7	7.68	19.1	0.32				
Aliphatic C5 - C6	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Aliphatic C6 - C8	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Aliphatic C8 - C10	mg/kg	1	5	1	1	1	1	1	1	1	1				
Aliphatic C10 - C12	mg/kg	1	5	1	1	1	1	1	1	1	1				
Aliphatic C12 - C16	mg/kg	2	5	1	2	2	2	2	1	2	1				
Aliphatic C16 - C21	mg/kg	2	5	1	5	4	2	4	2	6	1				
Aliphatic C21 - C35	mg/kg	69	231	2	30	24	21	15	25	38	1				
Total Aliphatic	mg/kg	73	231	2	37	30	25	21	28	46	1				
Aromatic C5 - C7	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Aromatic C7 - 8	mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
Aromatic C8 - C10	mg/kg	1	6	1	2	1	1	14	1	2	1				
Aromatic C10 - 12	mg/kg	1	7	1	8	2	2	47	1	1	1				
Aromatic C12 - C16	mg/kg	5	12	1	45	11	11	127	6	8	1				
Aromatic C16 - C21	mg/kg	20	70	1	150	66	47	191	23	53	1				
Aromatic C21 - C35	mg/kg	113	543	3	326	259	129	212	77	130	2				
Total Aromatic	mg/kg	139	637	4	532	340	189	191	109	193	2				
Total Aliphatic and Aromatic	mg/kg														

Pollutant Linkage				**Risk Assessment**			**Description of source [bold text]** Comment on hazard realisation [normal text]
Source	Contaminants of Concern	Pathway	Receptor	Consequence	Probability	Risk	
Historic warehouses Made Ground material used to backfill basements Car parking Urban Made Ground material	Metals, cyanide, chlorides, phenols, PAHs, solvents, fuel and oil wastes and asbestos	**The site has a variety of historic uses which has led to limited contamination within the MG**					
		Direct /dermal contact, ingestion, inhalation	Construction / Maintenance workers	Medium	Unlikely	Low	Potential for direct contact with contaminated materials during excavations / earthworks. Can be mitigated by good working practice, health and safety and use of PPE if necessary.
		Direct / dermal contact, ingestion, inhalation	Future site occupants and visitors	Medium	East of Cannon Place: Low Likelihood	Low	Pathway likely be removed in the end use as the site is envisaged to be covered either by the building(s) or hard / soft landscaping with clean build-ups. To be finalised as the development proposals evolve.
					West of Cannon Place: Unlikely	Low	
		Ingestion / inhalation	Occupants and visitors of neighbouring properties	Medium	Unlikely	Low	Residential / commercial neighbours surrounding and adjacent to the site. Good working practices i.e. dust suppression will need to be in place.
		Migration via permeable strata	Groundwater (Principal A Aquifer – Chester Fm.)	Medium	Unlikely	Low	Downward leaching of contaminants into the Principal A Aquifer (Chester Fm) due to infiltration is considered unlikely – current information suggests that there is a thickness of low permeability clay (Glacial Till) above the Chester Fm. Further prevention will be provided in the end use by drainage networks and potentially cover by hardstanding (depending on exact development proposals – to be reviewed). Procedures must be taken to avoid the creation of pathways during construction.
		Direct contact	Below ground services / infrastructure	Mild	Low Likelihood	Low	Any new services likely to be in clean corridors / trenches. Underground substructure will be designed to withstand appropriate concentrations of any chemicals that may be encountered (e.g. sulphate).
Potentially contaminative historic land uses to east / northeast (mills, warehouses, existing car parking etc.)	Leachable contaminants – metals, fuels, PAHs, petroleum hydrocarbons	**Mills/Warehouses recorded from1848 until 1933. Existing car parking potential source contamination from petrol and oils spills.**					
		Direct / dermal contact, ingestion, inhalation	Construction / Maintenance workers	Medium	Unlikely	Low	Potential for exposure to contaminated waters during foundation / service run excavation and ground works. Capable of mitigation by good working practice and use of PPE.
		Direct / dermal contact, ingestion, inhalation	Future site occupants and visitors	Medium	Unlikely	Low	Pathway likely be removed in the end use as the site is envisaged to be covered either by the building(s) or hard / soft landscaping with clean build-ups. To be finalised as the development proposals evolve.
Asbestos fibres and fragments within Made Ground	Asbestos	**Asbestos Containing Material (ACM) is likely to be present in Made Ground beneath the site because historic buildings were present.**					
		Inhalation	Construction / Maintenance workers	Severe	Low likelihood	Low	1 No. of 16 No. soil samples from the SS:L 2021 GI recorded asbestos within Made Ground. Asbestos Quantification recorded 0.003% by total mass. Also, Arkwrights Mill has been remediated. Mitigation by good working practice and use of PPE will be required and potentially special protective measures.
			Future site occupants and visitors	Severe	Unlikely	Low	Pathway between any asbestos in Made Ground and receptors is likely to be removed in the end use as the site is envisaged to be covered by either a building, hard landscaping with clean build-up, or soft landscaping with clean topsoil. This will need to be reviewed as the development proposals evolve.
Made Ground	Gas and vapour	**A variable thickness of Made Ground is anticipated to be present onsite, and there is the potential for this to be contaminated and provide a source of hazardous gas and vapour beneath the site.**					
		Inhalation Explosion (methane)	Construction / maintenance workers	Severe	Unlikely	Low	No methane recorded in the ground gas monitoring results. No source of methane on site. Limited potential for uncontrolled exposure to hazardous ground gas / vapour (if present) in confined unventilated excavations (if required). Capable of mitigation by gas monitoring to define the risks from ground gas and good construction practice e.g. avoiding works in confined spaces, where required PPE and air quality monitoring.
		Inhalation Explosion (methane)	Future site occupants and visitors	Severe	Unlikely	Low	No methane recorded in the ground gas monitoring results. No source of methane on site. Ground gas monitoring within Made Ground deposits has been undertaken as part of the SSL 2021 GI and classifies the site as CS1. No methane recorded in the ground gas monitoring results. No source of methane on site. It is considered that ground gas protection in accordance with the BS8485:2015+A1:2019 is not required.

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Appendix C Monitoring Visit Dates and Access

BHID	Monitoring Visit Date (DD/M/YY)	Access Possible / Monitored
BH101	13.08.21	Yes
	26.08.21	Yes
	07.09.21	No Access
	20.09.21	No Access
	06.10.21	Yes
	22.10.21	Yes
BH102	13.08.21	Yes
	26.08.21	Yes
	07.09.21	Yes
	20.09.21	No Access
	06.10.21	Yes
	22.10.21	Yes
BH103	13.08.21	Yes
	26.08.21	Yes
	07.09.21	Yes
	20.09.21	No Access
	06.10.21	Yes
	22.10.21	Yes
BH104	13.08.21	Yes
	26.08.21	Yes
	07.09.21	Yes
	20.09.21	No Access
	06.10.21	Yes
	22.10.21	Yes
WS101	13.08.21	Yes
	26.08.21	No Access
	07.09.21	No Access
	20.09.21	Yes
	06.10.21	No Access
	22.10.21	No Access
WS102	13.08.21	Yes
	26.08.21	Yes
	07.09.21	No Access
	20.09.21	No Access
	06.10.21	Yes
	22.10.21	Yes
WS103	13.08.21	Yes
	26.08.21	Yes

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BHID	Monitoring Visit Date (DD/M/YY)	Access Possible / Monitored
	07.09.21	Yes
	20.09.21	Yes
	06.10.21	Yes
	22.10.21	No Access
WS104	13.08.21	Yes
	26.08.21	Yes
	07.09.21	Yes
	20.09.21	Yes
	06.10.21	Yes
	22.10.21	Yes
WS105	13.08.21	Yes
	26.08.21	Yes
	07.09.21	No Access
	20.09.21	Yes
	06.10.21	Yes
	22.10.21	Yes

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