

London Road Fire Station Manchester

Piling Risk Assessment

Curtins Ref: 060270-CUR-00-XX-RP-GE-004

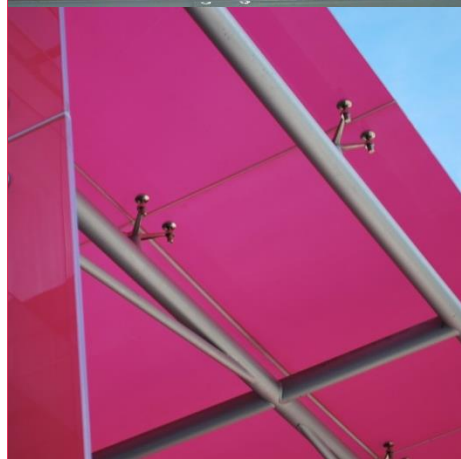
Revision: P02

Issue Date: 28 September 2021

Client Name: Allied London Fire Station Developments Limited

Client Address: No.1 Spinningfields Level 12, 1 Hardman Square, Manchester, M3 3EB

Site Address: London Road Fire Station, London Road, Manchester, M1 2PH



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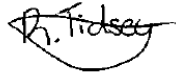
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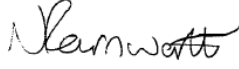


Piling Risk Assessment

Rev	Description	Issued by	Checked	Date
P01	Issue	NF	RA	13/09/2021
P02	Amendment to proposed development description	ZH	NF	28/09/2021

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1.0 Introduction

Piled foundations are proposed for the development at the London Road Fire Station building, London Road, Manchester, M1 2PH.

The proposed development on site comprises the refurbishment of the existing structure with extension to the eastern side. The mixed-use development is planned to include a hotel, restaurants, bars and retail units, and from the second floor upwards, residential apartments. The proposed development plans are included within *Appendix A* of this report.

The geology underlying the site corresponds with a Principal Aquifer classification, and as such a piling risk assessment (PRA) has been produced in order to identify the risks associated with a piled foundation solution.

The Environment Agency (EA) have been consulted by Manchester City Council (MCC) as part of the planning process. The EA have requested further information on a number of items to ensure the groundwater underlying the site is protected, including: providing a piling methodology control condition in order to ensure that any piled foundation designs do not risk entraining contaminated made ground with the pile and introducing contaminants to the top of the Principal Aquifer; providing written evidence that exploratory boreholes extending into the principal aquifer have been properly decommissioned, backfilled and sealed in accordance with EA guidance, and; providing evidence that no leachability testing is required or evidence of leachability testing for the development.

This report has been written to address this recommendation and the likely pre-commencement planning condition requirement for a piling risk assessment. It also provides evidence to demonstrate no leachability testing is required for the development given the proposed site surfacing will adequately prevent rainfall infiltration and therefore potential leaching of any contamination in site soils to the underlying aquifer.

It is understood that current development proposals include the use of Continuous Flight Auger (CFA) Piles to a maximum depth of circa 20m bgl.

Written evidence and confirmation of decommissioning of exploratory boreholes extending into the Principal aquifer are to be included under a separate covers.

1.1 Scope

This piling risk assessment provides an overview of the site's ground and groundwater conditions and considers the potential risks associated with the adoption of Continuous Flight Auger (CFA) to groundwater.

The report identifies appropriate risk management and monitoring protocols that can be adopted to ensure any residual risk is brought within adequate and practicable limits.

The report also provides evidence that the site is to be covered by impermeable materials which will adequately prevent rainfall infiltration and leaching from the made ground beneath the site.

1.2 References

In preparation of this report reference has been made to the following key guidance document:

- Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater & Contaminated Land Centre report NC/99/73 (EA Report 2001) (Ref. 2).

Reference is also made to the following geo-environmental reports undertaken for the site:

- Curtins (2016) London Road Fire Station, Manchester, Phase 1 Preliminary Site Assessment, Ref. B060270.001/APA/6737-00 (Ref. 3)
- Curtins (2017) London Road Fire Station, Manchester, Phase 2 Intrusive Investigation Report, Ref. B061230/JB/8131-A. (Ref. 1)

It is assumed that the client is in receipt of these reports and that they will also be submitted to and accepted by Manchester City Council to discharge relevant planning conditions.

2.0 The Site

This section of the report summarises the site setting, history, geology, hydrogeology, hydrology and environmental conditions at the site with reference to the geo-environmental reports referenced previously. It is not the intention of this report to duplicate these reports, with the information below providing the background information to support the piling risk assessment and recommendations. For further background information the full reports should be consulted.

2.1 The Site Setting

The site is centred at the approximate national grid reference SJ 84689 97813 and is 0.62ha in area. A site location plan is presented in *Figure 2.1*.

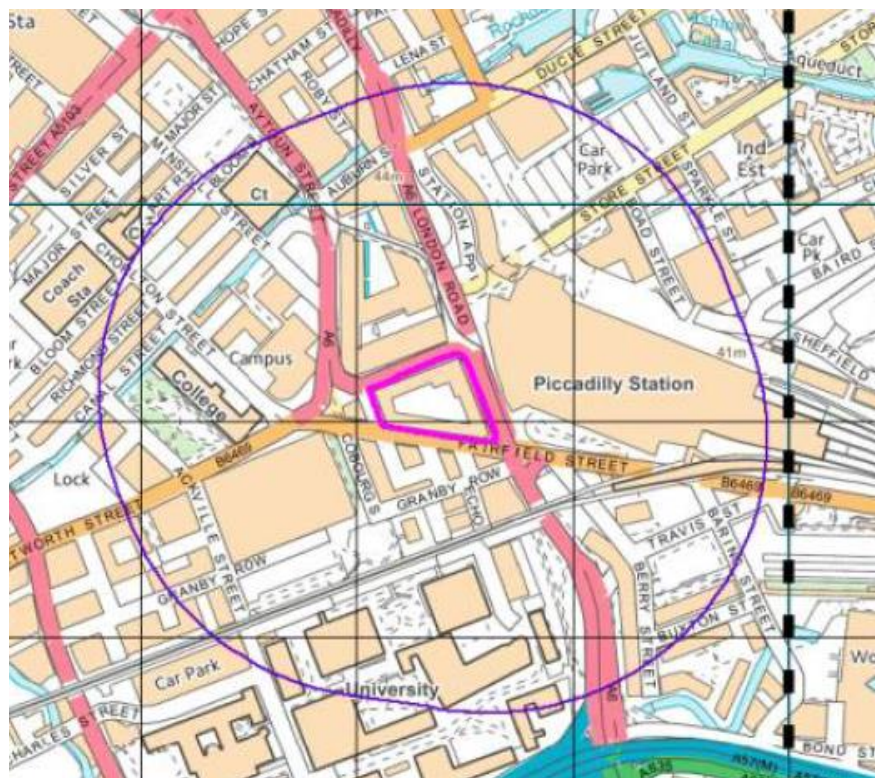


Figure 2.1 – Site Location Plan (site boundary shown in pink. 250m buffer in purple).
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The site is occupied by a Grade II* Listed historic fire station building which is currently in disuse. This comprises of a four-storey building with basements under the west corner, north, east and south of the building onsite. There is a courtyard in the centre, tower on the southern border and potentially an underground tank in the centre-north of the courtyard. The courtyard is covered with hardstanding.

2.2 Site History

The earliest mapping (1850s-90s) shows the site was developed with a high density terraced houses with a road intersecting the site. By 1908 the terraced houses have been removed and a single building, named as Chief Fire Station, is present with a courtyard in the centre. In 1922 the building is sub-divided into police station and ambulance station in the west, gas meter test station in the north, coroner's court and bank in the east with the rest of the site remaining a fire station and yard.

In the 1940s a control room was constructed in the south-east and a chimney is present in the west of the site. By 1950s-60s the ambulance station and gas meter test station are no longer present and motor repairs workshop is located in the northwest of the site. By 1992 the additional building in the southeast of the central courtyard has been demolished.

2.3 Hydrogeology and Hydrology

The site, corresponding with the underlying solid geology, is underlain by a Principal Aquifer within the bedrock (Chester Pebble Beds Formation, Sandstone) described as:

Layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, Principal aquifers are aquifers previously designated as a major aquifer.

The site is not situated within a Source Protection Zone (SPZ). No potable groundwater abstractions are identified within 1km of the site. The nearest non-potable abstraction points are two groundwater abstraction sites recorded 252m west of the site for a borehole for non-evaporative cooling, operated by West Contracting since January 2009.

The BGS recorded Made Ground over superficial Glacial Till, overlying the Chester Formation. Soils are noted to comprise sandy silty clay with gravel.

The nearest surface water feature is 42m north of the site. With a number of additional watercourse noted as canals and streams identified within the wider region.

2.4 Ground Model

The following sections present a summary of the ground conditions identified during the Curtins 2017 intrusive investigation. The exploratory hole logs are presented in *Appendix B*.

2.4.1 Made Ground

Made Ground was encountered in all exploratory holes undertaken in Curtins ground investigation, from ground level, generally ranging between 0.30m and 2.70m bgl. The greatest thickness was recorded in BH03.

Concrete was present in all locations, apart from BH02 and BH03, from ground level to a depth of 0.27m bgl. Brick paving was encountered in WS03 to 0.05m bgl. BH02 encountered brick paving to 0.10m bgl with concrete directly underlying it to 0.20m bgl

Made Ground was described as

- A coarse soil, of dark brown, sandy, angular-subangular gravel with localised sand.
- Brown, very gravelly, fine-coarse sand.
- Very soft-firm, dark brown, sandy, slightly gravelly clay.

Low to medium cobble content and anthropogenic fragments, including brick concrete, ash, plastic bags, metal, wood and glass, were present throughout the Made Ground. The depths of the Made Ground were not proven within HP01, TP01, TP02 and TP04 as they terminated at depths of 1.76-2.65m bgl.

2.4.2 Natural Deposits

Superficial Soils

Cohesive Glacial Till was recorded underlying Made Ground comprising of firm to stiff, brown, sandy, slightly gravelly clay, in BH01-BH03, HP03, HP07 and WS03 at depths of 0.30-2.10m bgl with a thickness ranging between 0.40m-3.00m.

The base of the clay was proven to a maximum depth of 4.00m bgl in BH03.

Residual Soils

Deposits indicative of heavily weathered bedrock were encountered in BH01-BH03, HP02, HP06, HP08 and WS03, underlying the cohesive Glacial Till from 0.33-4.00m bgl.

Deposits comprise of a red, brown, sandy, silty gravel was present in BH01 and BH02 at 3.70m bgl and 3.60m bgl, respectively. Red, brown, slightly silty, very clayey, fine-coarse sand, with occasional clay bands, at depths of 0.33-4.00m was present in BH03, HP02, HP06, HP08 and WS03.

The base of these soils was identified at 5.60-8.60m bgl, overlying the Chester Formation.

Bedrock (Chester Formation)

Sandstone bedrock was encountered beneath the Glacial till / Residual soils and recovered as partially weathered red, brown, slightly gravelly sand at depths of 5.60m, 8.60m and 5.90m bgl, in BH01, BH02 and BH03 respectively. HP04 and HP07 were advanced from the floor of the basements and encountered sandstone bedrock at depths of 1.40m and 0.77m bgl respectively. The base of the bedrock was not proven as BH01, BH02 and BH03 were terminated at depths of 8.00m, 17.00m and 8.00m bgl in the sandstone.

From BH02, bedrock is described as extremely weak, thinly bedded, reddish brown, medium and coarse-grained SANDSTONE which is distinctly weathered. Fractures sub-horizontal 80 to 85 degrees, very closely spaced, undulating, rough, moderately open to open with sand infilled discontinuities. Below 11m fractures change to sub-horizontal to horizontal increased to 80 to 90 degrees and closely spaced.

Where bedrock was recorded to be non-intact, deposits were recovered as gravel.

2.4.3 Groundwater

No groundwater strikes were recorded during the investigation.

A summary of post investigation groundwater level monitoring is presented in *Table 2.4.3*.

Table 2.4.3 – Groundwater Monitoring Results

Borehole Ref.	Installation Strata	Response Zone m bgl	Depth, m bgl (m AOD)					
			27/09/16	12/10/16	25/10/16	02/03/17	16/03/17	30/03/17
BH01	Clay and Gravel	3.00 – 5.00	– ²	Dry	Dry	– ¹	– ¹	– ¹
BH02	Sandstone (weathered Chester Formation)	9.00 – 12.00	– ²	11.74	11.78	– ²	11.57	11.50
BH03	Made Ground, Clay and Sand	1.00 – 6.00	– ²	Dry	Dry	– ¹	Dry	3.50
WS03	Clay	1.00 – 3.50	– ²	Dry	– ¹	– ²	Dry	Dry

–¹ Borehole not accessible

–² Groundwater level not monitored.

Based upon groundwater elevations and the underlying geology, the following considerations are given to the underlying groundwater regime:

- Although no groundwater strikes were recorded within the exploratory borehole logs, perched water may be encountered within the Made Ground (BH03).
- Within the bedrock (BH02) minimal groundwater was encountered.

2.5 Contamination Risk Assessments and Remediation

A programme of environmental chemistry testing was undertaken on soil samples obtained of the Made Ground (8 no.) and natural soils (4 no.).

Samples were tested for a broad suite of contamination as identified in the Phase 2 report. With the Made Ground samples also tested for the presence of asbestos. Contamination risk assessments and recommendations undertaken by Curtins are summarised below.

2.5.1 Soils

The environmental chemistry results were compared with Generic Assessment Criteria for soils with respect to human health for a 'Commercial' end use for a conservative 1% SOM for Made Ground and natural soils. No exceedances were identified.

No asbestos containing materials (ACMs) were identified during the investigation works or during laboratory analysis.

A **Low** risk rating is identified to construction workers, from soils and dust from inhalation and ingestion at this stage.

2.5.2 Controlled Waters

The nearest surface water feature is noted 41m northwest of the site. Given the presence of relatively impermeable shallow superficial soils and limited soil contamination, it is considered that the likelihood of shallow groundwater migrating to the water feature is unlikely. On this basis, the risk to surface water features was considered **Low**.

Due to insufficient volumes of groundwater within the monitoring installs, no groundwater samples were obtained. However, given no gross contamination was identified in soils on site, the presence of cohesive Glacial Till overlying the Principal Aquifer likely to limit migration of leachable contamination and given the site is not situated within a Source Protection Zone (SPZ), the risk to groundwater was considered to be **Low**.

2.5.3 Ground Gas

Six monitoring visits were completed between 27th September 2016 and 30th March 2017.

Methane and gas flow were recorded below the instrument's detection limit within all the monitoring wells throughout the monitoring period. Carbon dioxide was recorded between 0.5%

v/v to 2.0% v/v during the gas monitoring visits. The '*borehole*' Q_{hg} for the development site was derived, recording a maximum Q_{hg} of 0.0374/hr for carbon dioxide, using a maximum steady state air flow rate of -2.2 l/hr and carbon dioxide concentrations of 1.7% v/v (BH02, 4th visit), corresponding with a Characteristic Situation 1 (CS-1) ground gas regime.

The '*worst case*' Q_{hg} for the development site was derived, recorded a maximum Q_{hg} of 0.044l/hr for carbon dioxide where maximum steady state air flow rate of -2.2 l/hr was recorded on the fourth monitoring visit, and maximum gas concentrations of 2.0% v/v on the fourth and fifth monitoring visit.

This corresponds with a Characteristic Situation 1 (CS-1) ground gas regime. Subsequently gas protection measures are not required.

2.5.4 Aggressive Ground Conditions

The site has been classified in accordance with BRE Special Digest 1. Based on the laboratory test results it was considered that the Design Sulphate Classes and ACEC classes of DS-1 AC-1 being appropriate for the Made Ground and Superficial deposits.

3.0 Infiltration of Rainwater & Leaching

The majority of the site is covered by existing buildings which are to be retained, refurbished and extended. The central courtyard is to be covered by permeable paving. Surface water will be collected in channels and discharge to Type 3 sub-base of central paving area by perforated pipe. However, beneath the Type 3 sub-base an impermeable membrane is to be placed to prevent infiltration. The surface water run-off in the central courtyards will be attenuated in an underground attenuation tank, also wrapped in impermeable membrane, before being discharged to a United Utilities combined sewer. Curtins Drainage Strategy Drawing for the Ground Floor, Drainage Detail and External works Layout included in Appendix A illustrate these proposals.

Based on the building cover on site and paving proposals in the central courtyard, infiltration of rainwater through existing made ground soils will be prevented across the site. On this basis there is considered to be a very low risk from leaching of contaminants in made ground through rainfall infiltration. Soil leachability tests are not considered necessary ahead of the development.

4.0 Piling Risk Assessment

At the current design stage, the adoption of CFA piles at a maximum depth of c.20m bgl socketed into sandstone bedrock is considered to be the preferred piling solution. This method has been selected with consideration of minimal ground vibration, as well as groundwater protection aspects.

CFA piles essentially involve driving a large auger into the ground, with soils within the radius of the auger brought to surface and replaced with concrete on withdrawal of the auger. The displacement of the surrounding ground is governed by the speed of rotation of the auger relative to the speed of vertical penetration. Theoretically, it is possible to adjust the speeds so that the volume of soils displaced laterally and removed as arisings is equal to the volume of concrete placed.

Within the EA Report (2001), the six Source-Pathway-Receptor scenarios are identified as:

- 1. Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer;*
- 2. Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface;*
- 3. Direct contact of site workers and others with contaminated soil arising which have been brought to the surface;*
- 4. Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration);*
- 5. The driving of solid contaminants down into an aquifer during pile driving; and*
- 6. Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.*

This piling risk assessment tabulated overleaf address aspects 1, 4, 5 and 6 above only, in keeping with the objectives of this report (assessing the risk to groundwater). Other aspects should be appropriately dealt with through engineering design and suitable on-site management. The risk assessment methodology follows that presented in *Appendix C*.

Piling Risk Assessment

TABULATED RISK ASSESSMENT: CFA Piles

Aspect	Potential Consequence	Potential Probability	Potential Risk	Risk Management Options Available	Resultant Risk
1. Creation of preferential pathways, through a low permeability layer (an aquitard), to allow potential contamination of an underlying aquifer.	Medium Pollution of sensitive water resources in groundwater. Site overlies a Principal aquifer associated with the Chester Formation.	Unlikely - No evidence of free product or gross contamination identified in shallow soils. - Risk to groundwater considered to be Low. - CFA piling method essentially self-sealing with concrete and therefore no resultant pathway.	Low	Not required.	Low
4. Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).		Unlikely Soluble sulphate concentrations in soils generally meet a Design Sulphate class of DS-1 AC-1 for Made Ground soils and for natural soils.	Low	Not required.	Low
5. The driving of solid contaminants down into an aquifer during pile driving.		Low Likelihood Above considerations, plus: Low likelihood as arisings brought to surface in CFA methods, with speed of auger rotation to be matched with downward force to avoid driving soils down.	Moderate / Low	Speed of auger rotation needs to be matched with downward force to avoid driving soils down.	Low
6. Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.		Low Likelihood Above considerations but accounting for potential for 'bleeding' of concrete.	Moderate / Low	Cement content of the concrete will need to be closely monitored so that this in itself does not 'bleed' into groundwater.	Low

5.0 Summary and Recommendations

The risk assessment presented herein has concluded that there is a low risk to contamination of groundwater beneath the site from the use of CFA piling, providing that the following risk management measures are put in place:

- *Speed of auger rotation needs to be matched with downward force to avoid driving soils down; and*
- *Cement content of the concrete will need to be closely monitored so that this in itself does not 'bleed' into groundwater.*
- *Suitable sulphate resistant concrete should be used for all substructures to remain in contact with Made Ground soils meeting a DS-1 DS class and AC-1 ACEC class in accordance with BRE Special Digest 1:2005 Concrete in Aggressive Ground guidance.*

The following considerations should also be taken into account:

- *The piling contractor should prepare and submit relevant method statements for approval prior to piling works commencing;*
- *Where arisings are generated, they should be classified, handled and disposed of in compliance with relevant best practice and regulatory requirements;*
- *The piling contractor should make allowance for the provision of appropriate PPE based on chemical analysis results within the Phase 2 Ground Investigation Report; and*
- *In the event of uncovering any areas of unexpected contamination during the piling works, including odorous or stained soils, works should be ceased with the advice of the appointed environmental consultant sought immediately.*

It is further concluded that based on the building cover on site and paving proposals in the central courtyard infiltration of rainwater will be prevented across the site. On this basis there is considered to be a very low risk from leaching of contaminants in made ground through rainfall infiltration. Soil leachability tests are not considered necessary ahead of the development.

This document should be forwarded to the Planning Authority for discharge of the relevant planning condition before piling works commence to disclose that there is a low risk to groundwater from the proposed use of CFA piling on site where the above risk management measures are adhered to and to detail as to why soil leachability tests are not considered necessary ahead of the development.

6.0 References

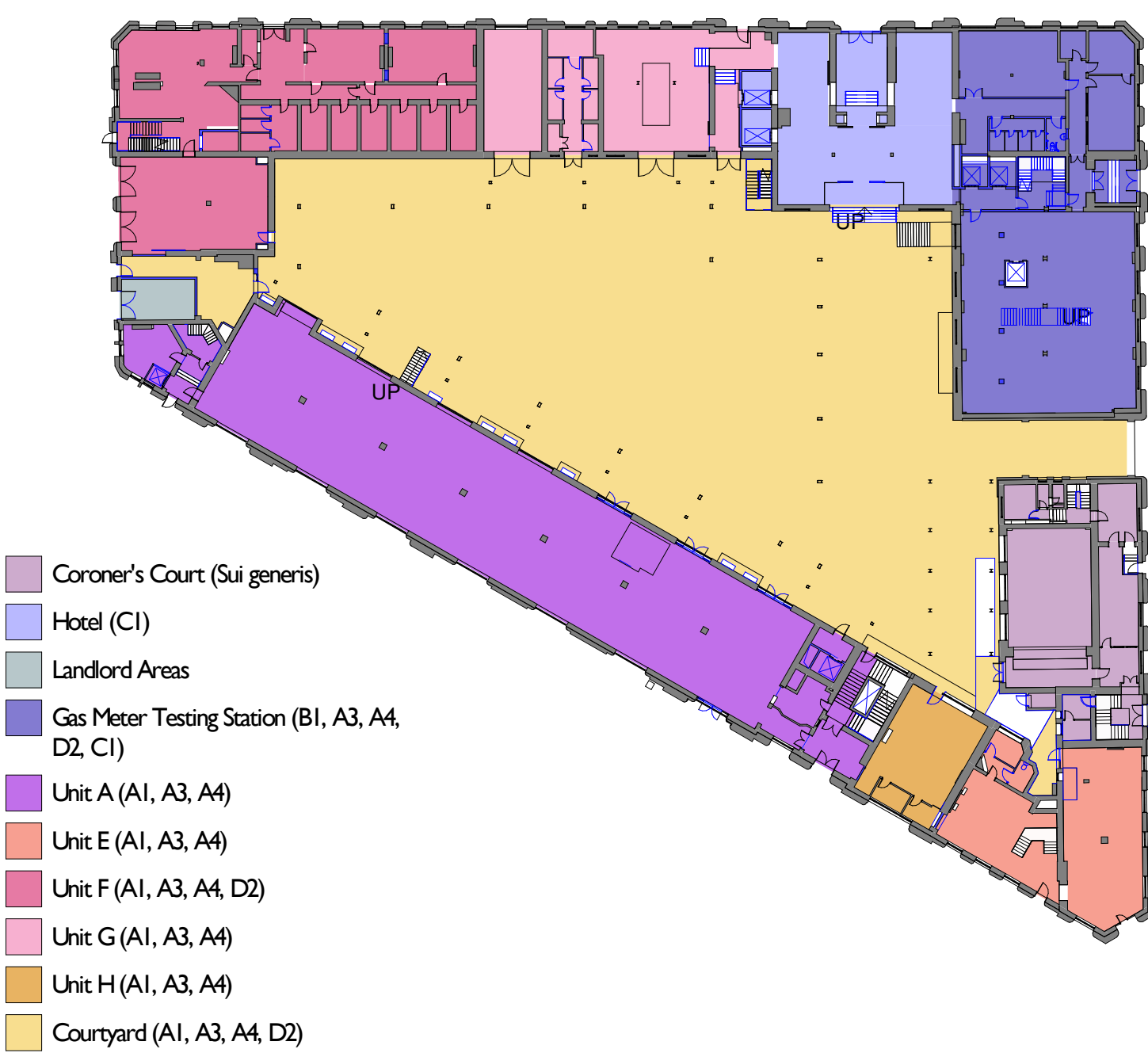
1. Curtins (2017) London Road Fire Station, Manchester, Phase 2 Intrusive Investigation Report, Ref. B061230/JB/8131-A
2. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater & Contaminated Land Centre report NC/99/73 (EA Report 2001)
3. Curtins (2016) London Road Fire Station, Manchester, Phase 1 Preliminary Site Assessment, Ref. B060270.001/APA/6737-00

Appendix A – Drawings

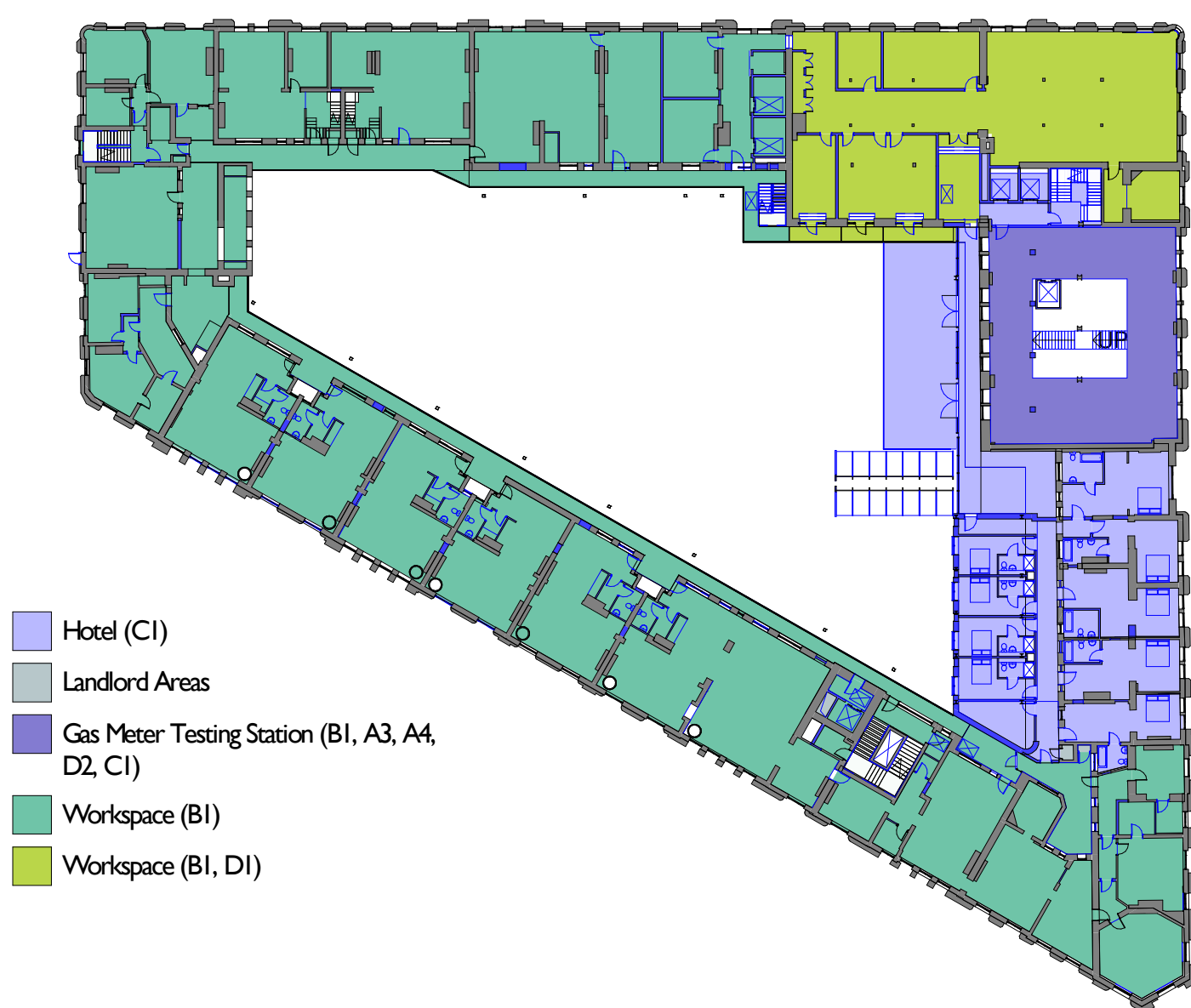
- Development Plans
- Curtins Exploratory Hole Location Plan
- Curtins Drainage Strategy Ground Floor Drawing
- Curtins External Works Layout Drawing
- Curtins Drainage Detail Drawing Sheet 3



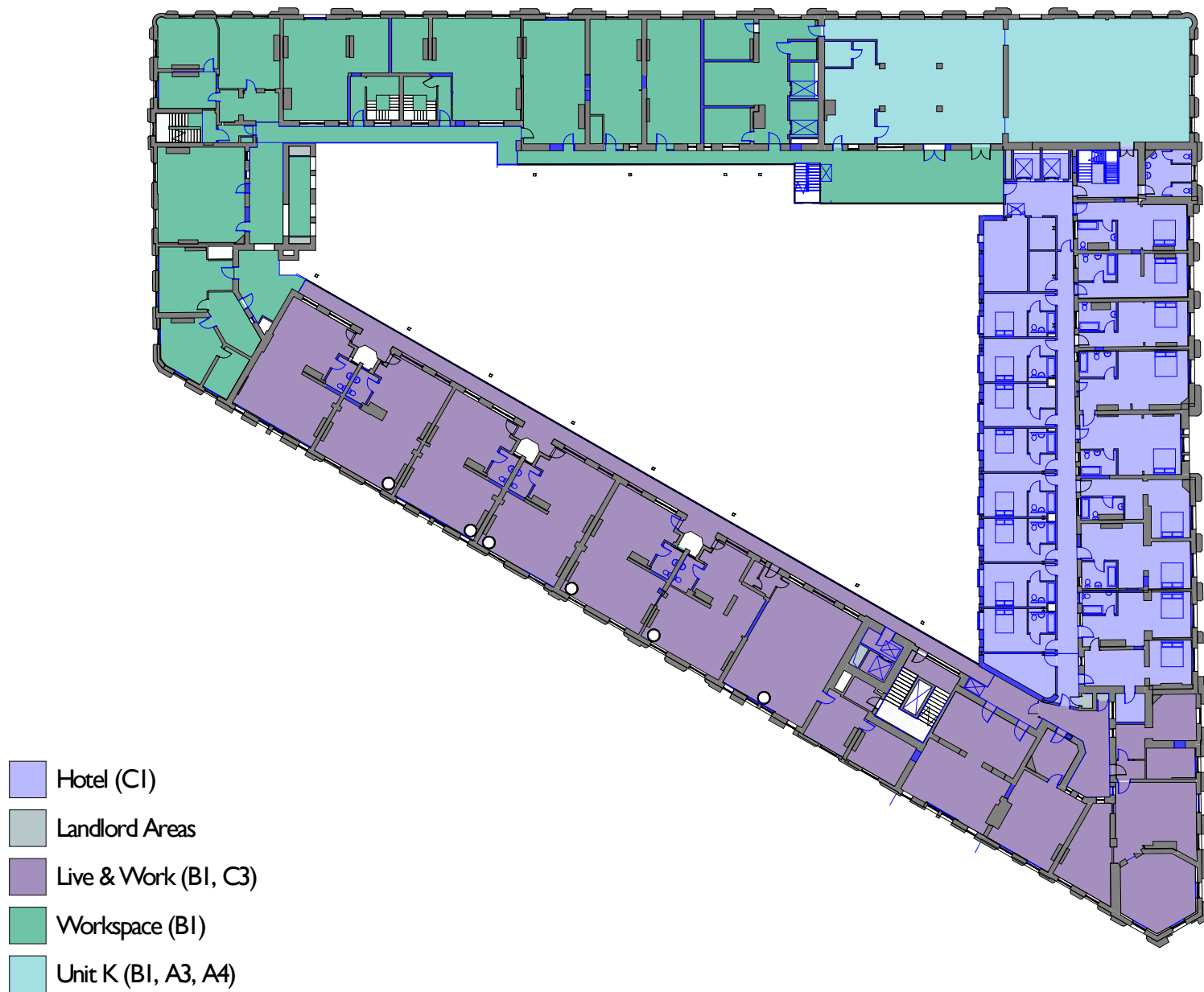
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7001 I : 500



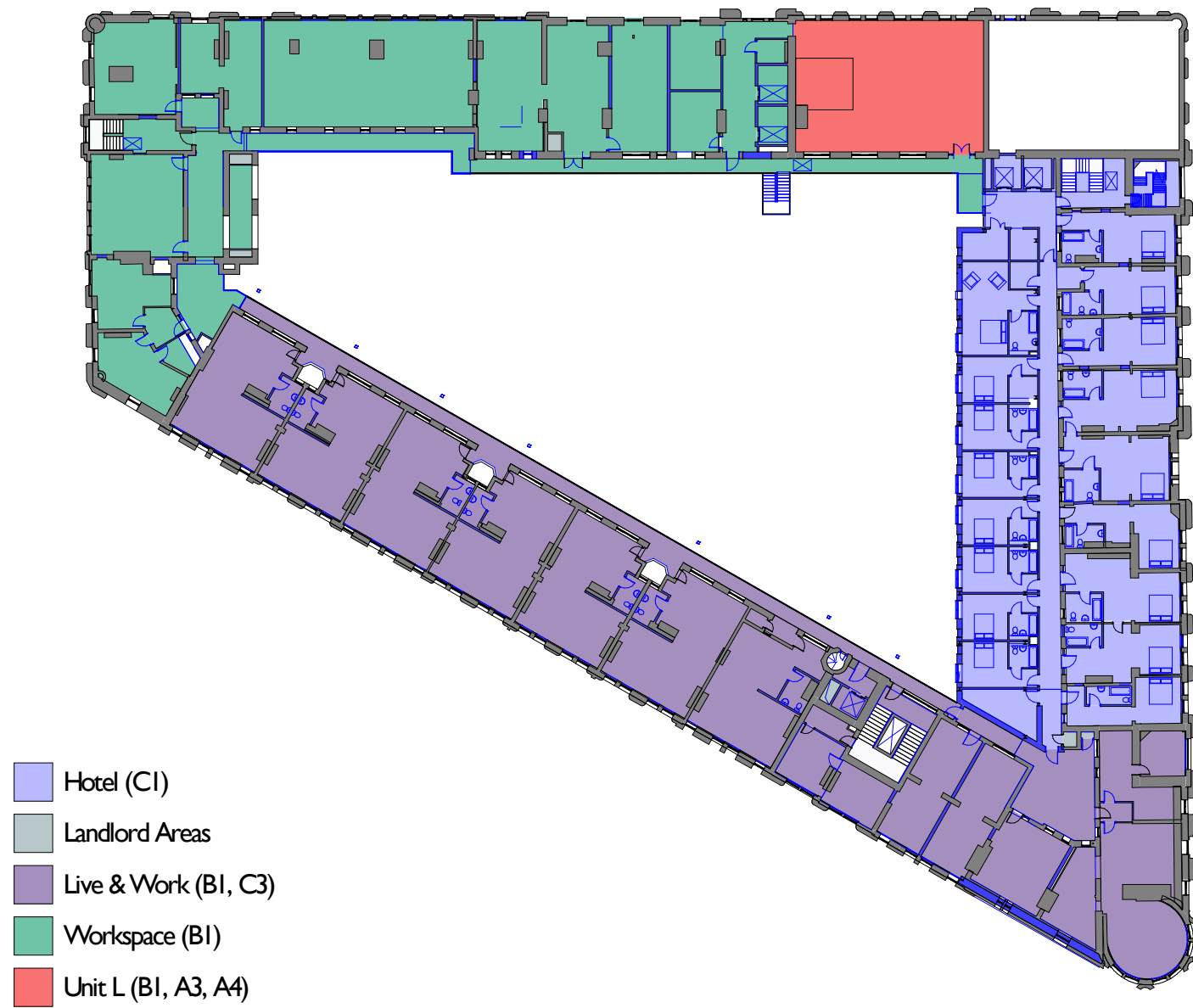
1 00 Ground Floor GA Acc
7001 I : 500



4 01 First Floor GA Acc
7001 I : 500



3 02 Second Floor GA Acc
7001 I : 500



5 Third Floor GA Acc
7001 I : 500

Department	Area
Coroner's Court (Sui generis)	199 m²
Hotel (C1)	365 m²
Landlord Areas	85 m²
Screening Room (B1, A3, A4, D2, C1)	282 m²
Unit A (A1, A3, A4)	694 m²
Unit E (A1, A3, A4)	74 m²
Unit F (A1, A3, A4, D2)	142 m²
Grand total: 100	1841 m²

Department	Area
Coroner's Court (Sui generis)	122 m²
Courtyard (A1, A3, A4, D2)	1761 m²
Gas Meter Testing Station (B1, A3, A4, D2, C1)	428 m²
Hotel (C1)	216 m²
Landlord Areas	21 m²
Unit A (A1, A3, A4)	654 m²
Unit E (A1, A3, A4)	168 m²
Unit F (A1, A3, A4, D2)	360 m²
Unit G (A1, A3, A4)	210 m²
Unit H (A1, A3, A4)	71 m²
Grand total: 78	4011 m²

Department	Area
Gas Meter Testing Station (B1, A3, A4, D2, C1)	185 m²
Hotel (C1)	498 m²
Landlord Areas	3 m²
Workspace (B1)	1648 m²
Workspace (B1, D1)	391 m²
Grand total: 92	2725 m²

Department	Area
Hotel (C1)	644 m²
Landlord Areas	7 m²
Live & Work (B1, C3)	927 m²
Unit K (B1, A3, A4)	300 m²
Workspace (B1)	767 m²
Grand total: 98	2645 m²

Department	Area
Hotel (C1)	640 m²
Landlord Areas	85 m²
Live & Work (B1, C3)	911 m²
Unit L (B1, A3, A4)	149 m²
Workspace (B1)	646 m²
Grand total: 93	2430 m²

Notes:

Drawings are based on survey data and may not accurately represent what is physically present.

Do not scale from this drawing. All dimensions are to be verified on site before proceeding with the work.

All dimensions are in millimeters unless noted otherwise.

Purcell shall be notified in writing of any discrepancies.

Key Plan

not to scale

I 02/12/19 For planning

REV DATE DESCRIPTION

CLIENT

Allied London

PROJECT

London Road Fire Station -
2019
240242

TITLE

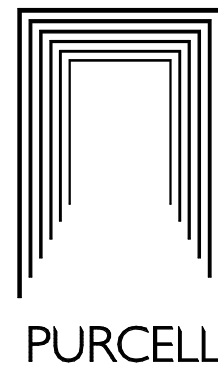
Accomodation Schedule

SIZE SCALE LAST REVISED DRAWN CHECKED
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REV SUITABILITY/REASON FOR ISSUE
I **S2 - Issued for Planning**

DRAWING NUMBER
240242-PUR-FS-ZZ-DR-A-7001

St James', 79 Oxford Street, Manchester, M1 4FQ
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TP1 - TP4 - Machine excavated trial pits to determine the size, depth+construction of foundations. All pits to be extended to base of wall (foundation for inspection by Engineer)



BH1 and BH3 - Cable Percussion borehole to maximum 10m

BH2* Cable Percussion borehole to maximum 10m with 5m rotary core



WS1 - WS4 - Window Sample boreholes to maximum 5m



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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

INFORMATION

Project:

London Rd. Fire & Police Station

Dwg Title:

Proposed Exploratory Hole Location
Plan- Ground Floor

Scale:

Size:	First Issue:	Drawn:	Checked:
A3	17.05.2016	LR	SH

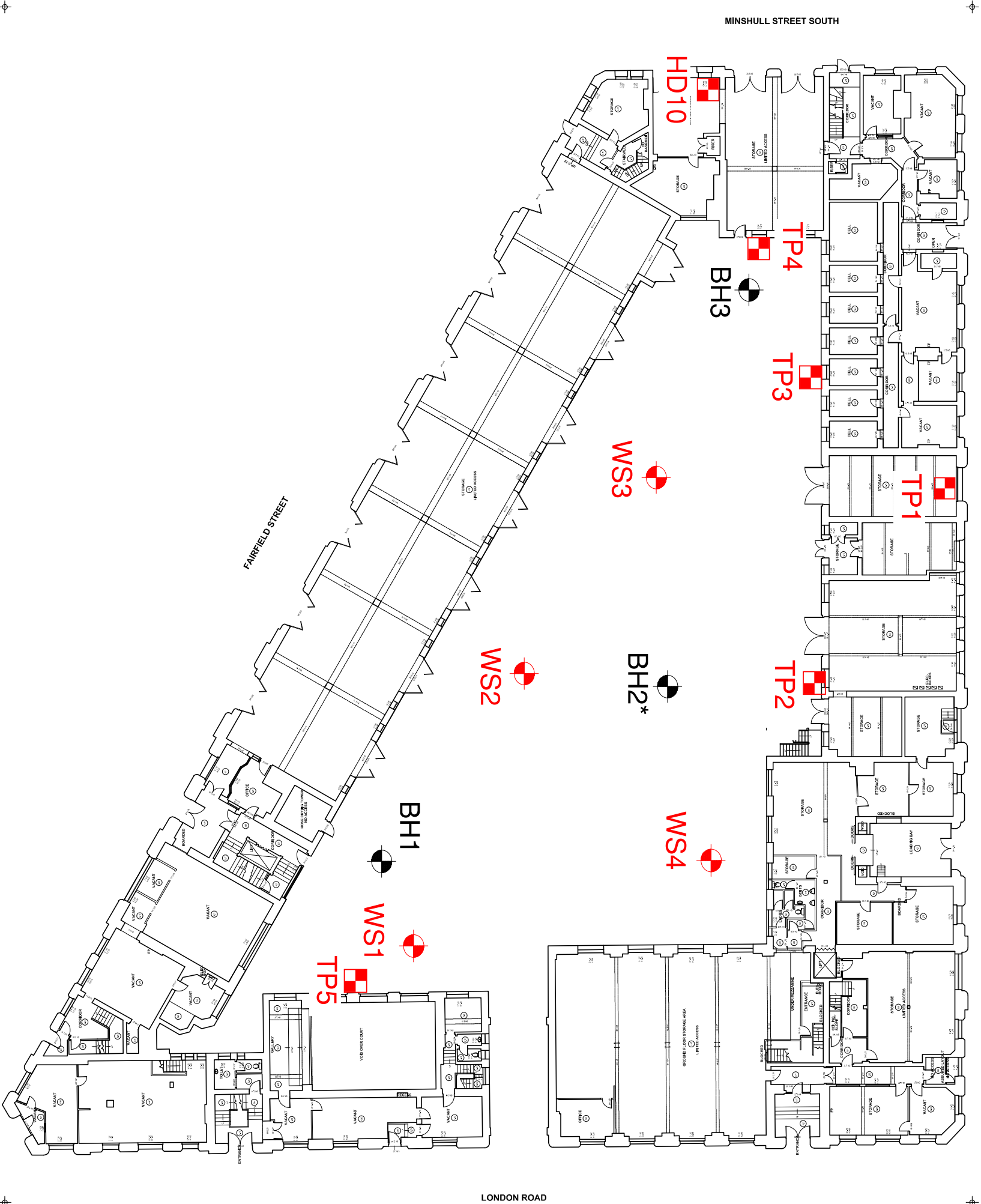
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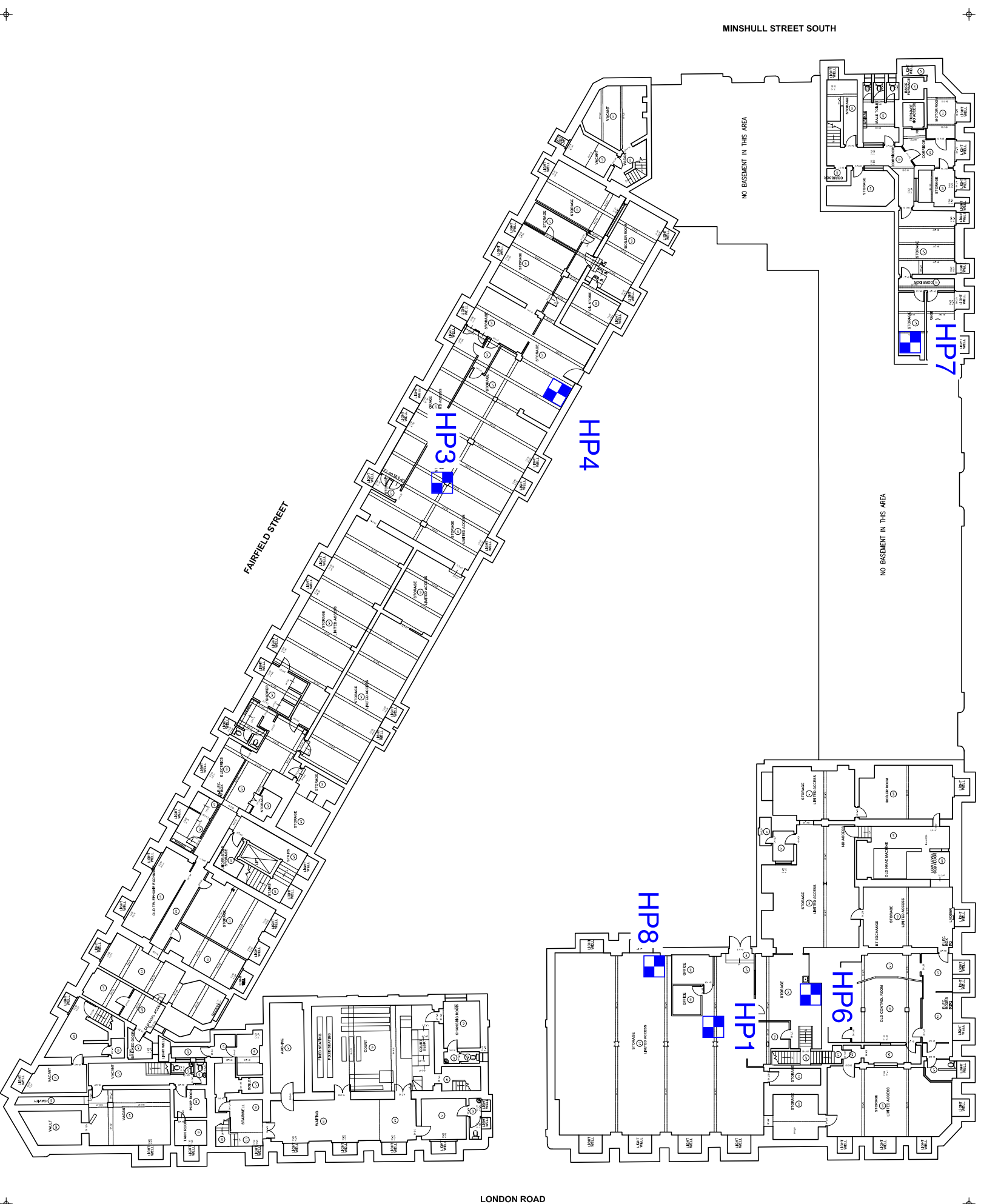
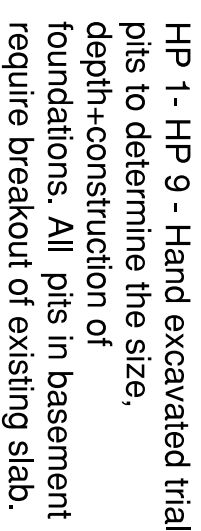
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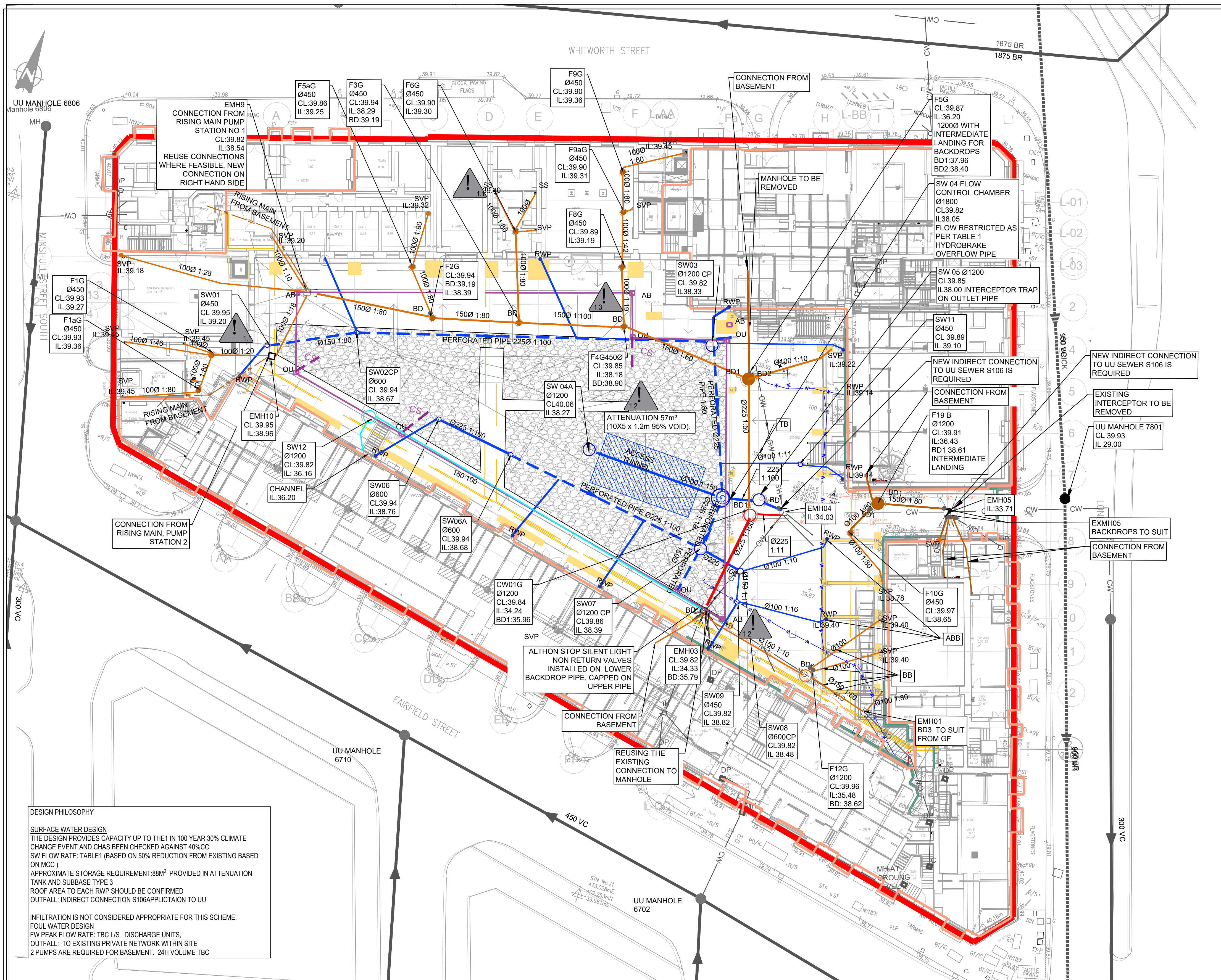
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Rev:	Description:	Date:	By:	Chkd:
				
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Status:				
INFORMATION				
Project:				
London Rd. Fire & Police Station				
Dwg Title:				
Proposed Exploratory Hole Location Plan-Basement Floor				
Scale:	Size:	First Issue:	Drawn:	Checked:
	A3	17.05.2016	LR	SH
Dwg No:	B061230/L002			Rev:
				C
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DESIGN PHILOSOPHY

SURFACE WATER DESIGN

THE DESIGN PROVIDES CAPACITY UP TO THE 1 IN 100 YEAR 30% CLIMATE CHANGE EVENT AND HAS BEEN CHECKED AGAINST 40%CC SW FLOW RATE: TABLE 1 (BASED ON 50% REDUCTION FROM EXISTING BASED ON MCC)

APPROXIMATE STORAGE REQUIREMENT: 88m³ PROVIDED IN ATTENUATION TANK AND SUBBASE TYPE 3

ROOF AREA TO EACH RWP SHOULD BE CONFIRMED

OUTFALL: INDIRECT CONNECTION S106 APPLICATION TO UU

INFILTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN

FW PEAK FLOW RATE: TBC L/S DISCHARGE UNITS.

OUTFALL: TO EXISTING PRIVATE NETWORK WITHIN SITE

2 PUMPS ARE REQUIRED FOR BASEMENT. 24H VOLUME TBC

EXISTING CAPACITY HAVE BEEN CHECKED FOR FLOWS PROVIDED BY M&E DRAWINGS

EXISTING MANHOLE COVERS WILL REQUIRE TO BE ADJUST TO PROPOSED LEVELS

CONFIRMATION OF WATER MAIN LOCATION REQUIRED

ATTENUATION	
ATTENUATION TANK	57 m3
SUBBASE TYPE 3	629m2X0.15mX0.33=31m3
TOTAL	88 m3

PROPOSED SERVICES BASED ON STAGE 3 DRAWINGS. IT IS UNKNOWN IF EXISTING WATER STAYS IN THE SAME LOCATION. TYPE 3 SUBBASE SUBJECT TO CHANGE DEPENDS ON FIXED SERVICES

TABLE 1					
SITE	IMPERMEABLE AREA (HA)	FLOW RATE 1:1 YEAR (L/S)	FLOW RATES 1:2 YEAR L/S	FLOW RATE 1:30 YEAR (L/S)	FLOW RATE 1:100 YEAR (L/S)
EXISTING SITE	0.33	43.5	56.2	122.3	151
INCLUDING A 50% REDUCTION, IN ACCORDANCE WITH MCC					
PROPOSED SITE	0.33	22	28	61	76
UNITED UTILITIES REQUESTED MAX 1 IN 2 YEAR STORM EVENT					
FLOW LIMITED TO 22 L/S FOR EACH STORM EVENT UP TO 1 IN 100+40 CC TO MEET MCC AND UU REQUIREMENTS					
HYDROBRAKE TYPE MD-SHE-01492-2200-2000-2200					

RESIDUAL HAZARD REGISTER		
HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING. SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS.		
HAZARD REF No.	ITEM (FEATURE, ELEMENT OR ACTIVITY)	RESIDUAL HAZARD
5.5	CONSTRUCTION	EXCAVATION NEAR OR THROUGH EXISTING FOUNDATION TO INSTALL PROPOSED DRAINAGE
3.1	CONSTRUCTION	EXCAVATION NEAR EXISTING SERVICES AND EXISTING DRAINAGE
5.1	CONSTRUCTION	DEEP EXCAVATION ABOVE >3M REFER TO MH SCHEDULE FOR MORE DETAILS

DRAWING BASED ON:

GPR SURVEY: LOCATE SURVEYS LTD, LSL:17499:200:1:1#

CCTV SURVEY LAYER SURVEY 01.06.20

ARCHITECT LAYOUT: LRFS-PUR-01-00-DR-A-2003 REV18

LRFS-PUR-01-ZZ-DR-A-4120 - Proposed Courtyard REV 6

FOUNDATION RECEIVED 03.09.21

POUP LOCATION 647-M-(52)-00-01 T2

DISCHARGE UNITS CONSOLUX 15.07.21

EXTERNAL SERVICES 119.07.21

647-M-(54)-00-01 - Gas Services Layout T2

FOR PIPES WHICH SHOULD BE ABANDONED REFER TO 060270-CUR-00-XX-DR-C-92502 EXISTING DRAINAGE

GENERAL NOTES:

FOUNDATIONS ARE TO BE FORWARDED TO THE ENGINEER, ALLOWING SUFFICIENT TIME FOR AN ALTERNATIVE SOLUTION TO BE PROPOSED.

INVERT LEVELS AT MANHOLES/ INSPECTION CHAMBERS TO BE USED TO SET OUT PIPEWORK. PIPE GRADIENTS ARE SHOWN INDICATIVELY ONLY.

ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS.

ALL SEWERS, UNLESS AGREED OTHERWISE STATED, SHALL BE:

- 100mm to 300mm DIA TO BE VITRIFIED CLAY.
- 375mm DIA AND GREATER TO BE CLASS 120 CONCRETE PIPES.

AS AN ALTERNATIVE THE CONTRACTOR MAY USE AN APPROVED UNPLASTICISED POLYVINYL CHLORIDE (PVCU) WITH APPROVAL FROM THE ENGINEER.

SEWER PIPES TO BE LAID IN MAXIMUM 3 METRE LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER LENGTHS.

THE FIRST PIPE OUT OF MANHOLES TO BE AS SHORT AS PRACTICABLE SO AS TO PROVIDE A FLEXIBLE JOINT AS CLOSE AS POSSIBLE TO THE OUTSIDE FACE OF THE CONCRETE SURROUND AND CONNECTED TO A LENGTH OF ROCKER PIPE.

ALL NEW CONNECTIONS INTO EXISTING MANHOLES (OR INTO EXISTING SEWERS) TO BE 'SOFFITS LEVEL' UNLESS OTHERWISE NOTED.

ALL PRIVATE DRAINAGE PIPES WITH A COVER OF LESS THAN 600mm IN NON-TRAFFICKED AREAS AND LESS THAN 1200mm IN TRAFFICKED AREAS TO BE BEDDED AND SURROUNDED IN CONCRETE (CLASS Z). COMPRESSIBLE MATERIAL SHALL BE PROVIDED AT EVERY PIPE JOINT. WHERE COVER EXCEEDS THIS DEPTH, PIPES ARE TYPICALLY BEDDED AND SURROUNDED IN CLASS S. REFER TO PIPE EMBEDMENT DETAILS DRAWING FOR SPECIFIC TYPES.

WHERE DRAINAGE PIPES ARE LESS THAN 300mm BELOW THE UNDERSIDE OF THE GROUND FLOOR SLAB, CONCRETE ENCASEMENT IS REQUIRED (CLASS Z). COMPRESSIBLE JOINTS ARE TO BE PROVIDED AT EVERY PIPE JOINT WITHIN THE CONCRETE.

WHERE PIPES ARE MORE THAN 300mm BELOW THE UNDERSIDE OF THE SLAB, CLASS S BEDDING IS ACCEPTABLE.

WHERE FOUL SEWERS RUN ABOVE SURFACE SEWERS, CONCRETE PROTECTION MAY BE REQUIRED AT CROSSOVERS TO PREVENT ANY POTENTIAL CONTAMINATION.

ALL CONNECTIONS PASSING THROUGH BASES OR EDGE BEAMS TO BE IN SEALED SLEEVES. ALTERNATIVELY CONNECTIONS MAY BE CAST-IN WITH FLEXIBLE JOINTS NOT GREATER THAN 150MM FROM FACE OF CONCRETE.

THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED TO ACCOMMODATE THE CONNECTIONS AND BENDS.

ALL MANHOLE COVERS IN BLOCK/SLAB AND EXTERNAL PAVING AREAS TO HAVE RECESSED COVERS OF THE APPROPRIATE GRADE TO ACCEPT ARCHITECT'S PAVING PROPOSAL.

ALL INTERNAL COVERS TO HAVE MECHANICALLY JOINTED CORNERS AND DOUBLE SEALED WITH RECESSED TRAY TO ALLOW FOR FINISHES.

UNLESS NOTED OTHERWISE IN THE MANHOLE SCHEDULE, ALL MANHOLE, GULLY AND CHANNEL COVERS (IRONWORK) SHOULD BE THE FOLLOWING SPECIFICATION:

- B125 LOAD CLASS IN PEDESTRIAN AREAS
- D400 LOAD CLASS IN VEHICULAR AREAS

ALL PROPRIETARY PRODUCTS TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.

GREASE TRAPS SHOULD BE PROVIDED ABOVE GROUND WITHIN AN ENZYME TREATMENT SYSTEM, BY APPROPRIATE SPECIALIST DESIGNER.

THE DESIGN IS BASED ON A GRAVITY RAINWATER SYSTEM. WHERE A SIPHONIC SYSTEM IS PROPOSED ADDITIONAL NOTES REQUIRED AND DESIGN ADJUSTED TO SUIT.

ALL FOUL WATER CONNECTION POINTS ARE INDICATIVE AND ARE SUBJECT TO THE ARCHITECT'S FINAL GROUND AND BASEMENT LAYOUT.

P05	UPDATES TO STAGE 4	19.08.21	MW	MW
P04	S106 APPROVAL, TEAMS COMMENTS	13.10.20	MW	MW
P03	STAGE 4 DRAFT	08.09.20	MW	MW
P02	STAGE 3 ISSUE	31.01.20	MW	MW

Rev.	Description:	Date:	By:	Chkd:

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Status:

STAGE 4

Project:

LONDON ROAD FIRE STATION

Dwg Title:

DRAINAGE STRATEGY GROUND FLOOR

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	22/11/19	TM	CG	CG

Scale: 1:200

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
060270	CUR	00	XX	DR	C	92501	P05

GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- REFER TO THE DRAINAGE LAYOUT FOR THE LOCATION OF THE FLOW CONTROL.
- FLOW CONTROL TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
- WHERE ALTERNATIVE FLOW CONTROL DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
- DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
- THE DESIGN OF THE TANK SHOULD BE PROVIDED BY THE MANUFACTURER OR SUPPLIER TO ENSURE THE TANK IS SUFFICIENT FOR THE SITE SPECIFIC CRITERIA.
- THE TANK DESIGN SHOULD INCORPORATE:
 - CRATES SUBJECT TO OCCASIONAL HGV LOADING,
 - SUITABLE MAINTENANCE ACCESS; AND
 - VENTING TO PREVENT TRAPPED AIR POCKETS.
- THE STRENGTH OF THE TANK SHOULD COMPLY WITH CIRIA C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS.
- ACCESS FOR MAINTENANCE SHOULD BE IN ACCORDANCE WITH CIRIA GUIDANCE.
- VENTING TO THE TANK SHOULD BE CONFIRMED BY THE TANK MANUFACTURER. VENTING SHOULD BE LOCATED WITHIN LANDSCAPED AREAS, OR ROUTED BACK TO THE NEAREST MANHOLE ABOVE THE DESIGN WATER LEVEL.
- CONSTRUCTION AND INSTALLATION OF THE TANK SHOULD BE STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
- THE CURRENT DESIGN OF THE TANK IS BASED ON USE OF POLYPIPE POLYSTORM PSM1 UNITS. TO ALLOW AN ASSUMPTION OF UNIT SIZES WITHIN THE OVERALL DESIGN. HOWEVER, WHERE AN ALTERNATIVE SYSTEM IS PROPOSED, THE DIMENSIONS OF THE UNITS WILL NEED TO BE CHECKED WITHIN THE DESIGN AND MAY RESULT IN A REDESIGN.
- THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, FILLING MATERIALS, HEAVY PLANTS ETC.

WORK IN PROGRESS, TANK
SIZE MAY CHANGE
WHEN DRAINAGE MODELLED
WITH REQUIRED INFORMATION

P03	STAGE 4	13.10.20	MW	MW
P02	STAGE 4 DRAFT	07/09/20	MW	MW
P01	STAGE 3 ISSUE	31/01/20	MW	MW
Rev:	Description:	Date:	By:	Chkd:



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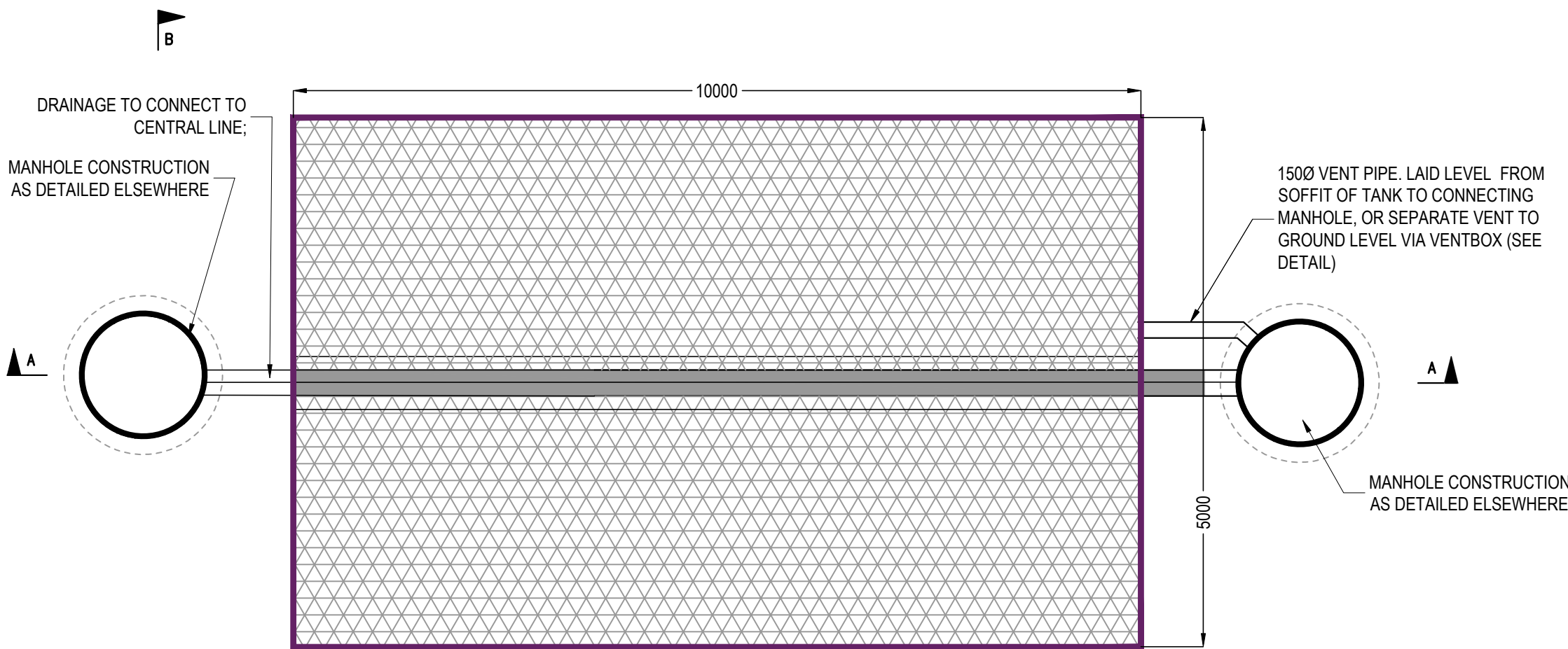
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STAGE 4

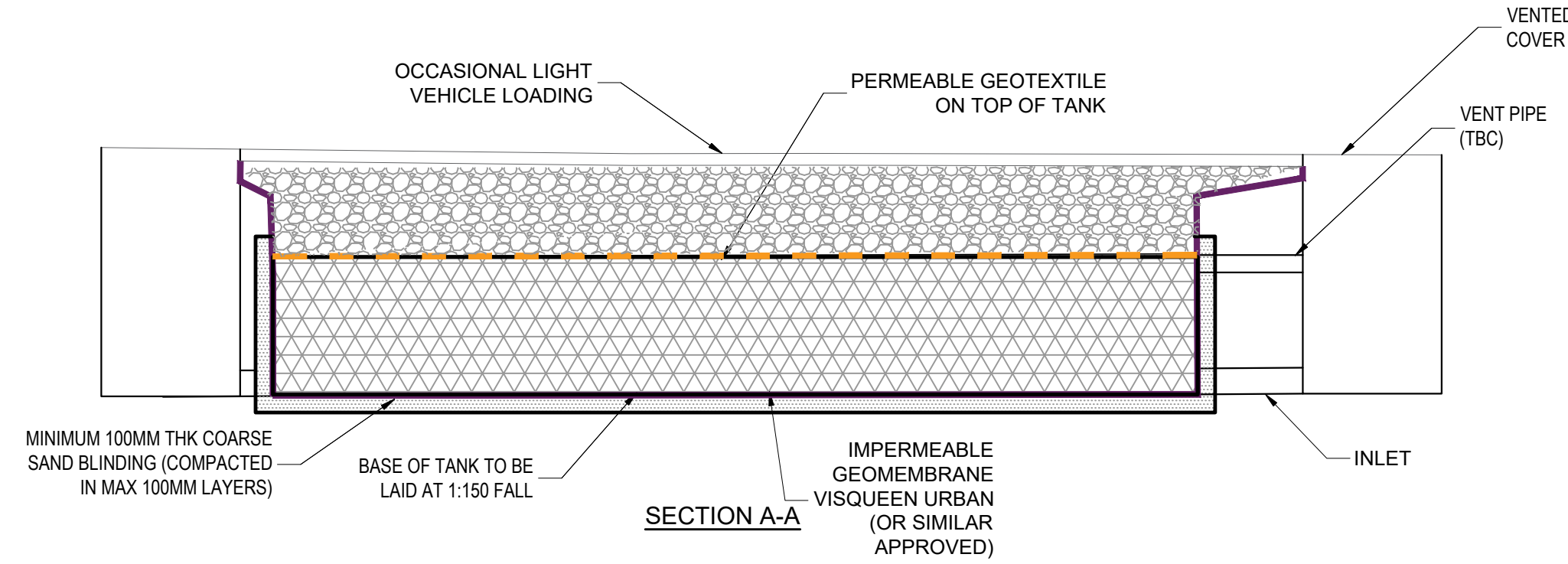
LONDON ROAD FIRE STATION

Drig Title:
DRAINAGE DETAIL
SHEET 3 OF 5

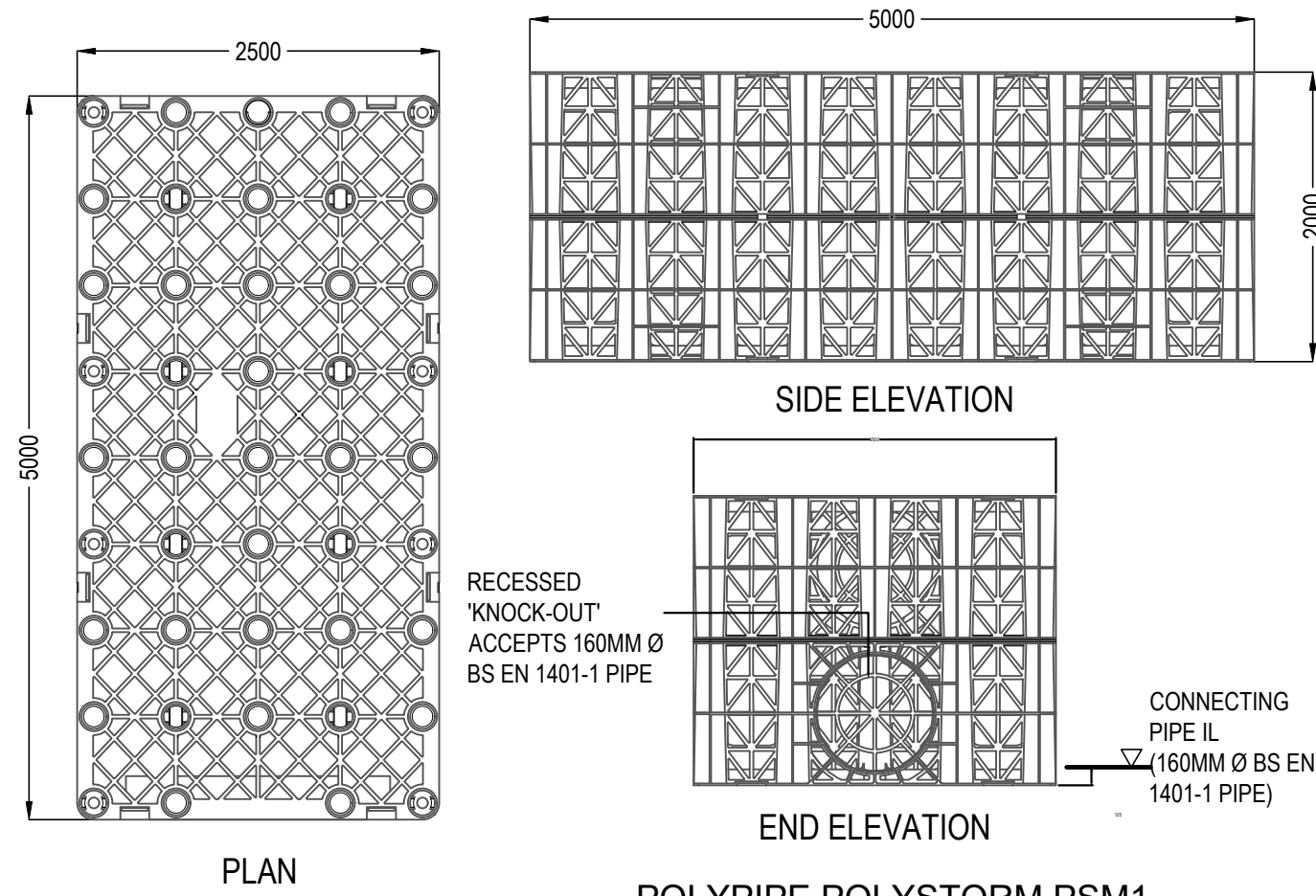
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	31/01/19	MW	MW	MW
Scale:	1:NTS			
Project No:	Originator:	Zone:	Level:	Type: Discipline: Category / Number: Rev:
060270 - CUR - 00	- XX - DR - C -	92522	-P03	



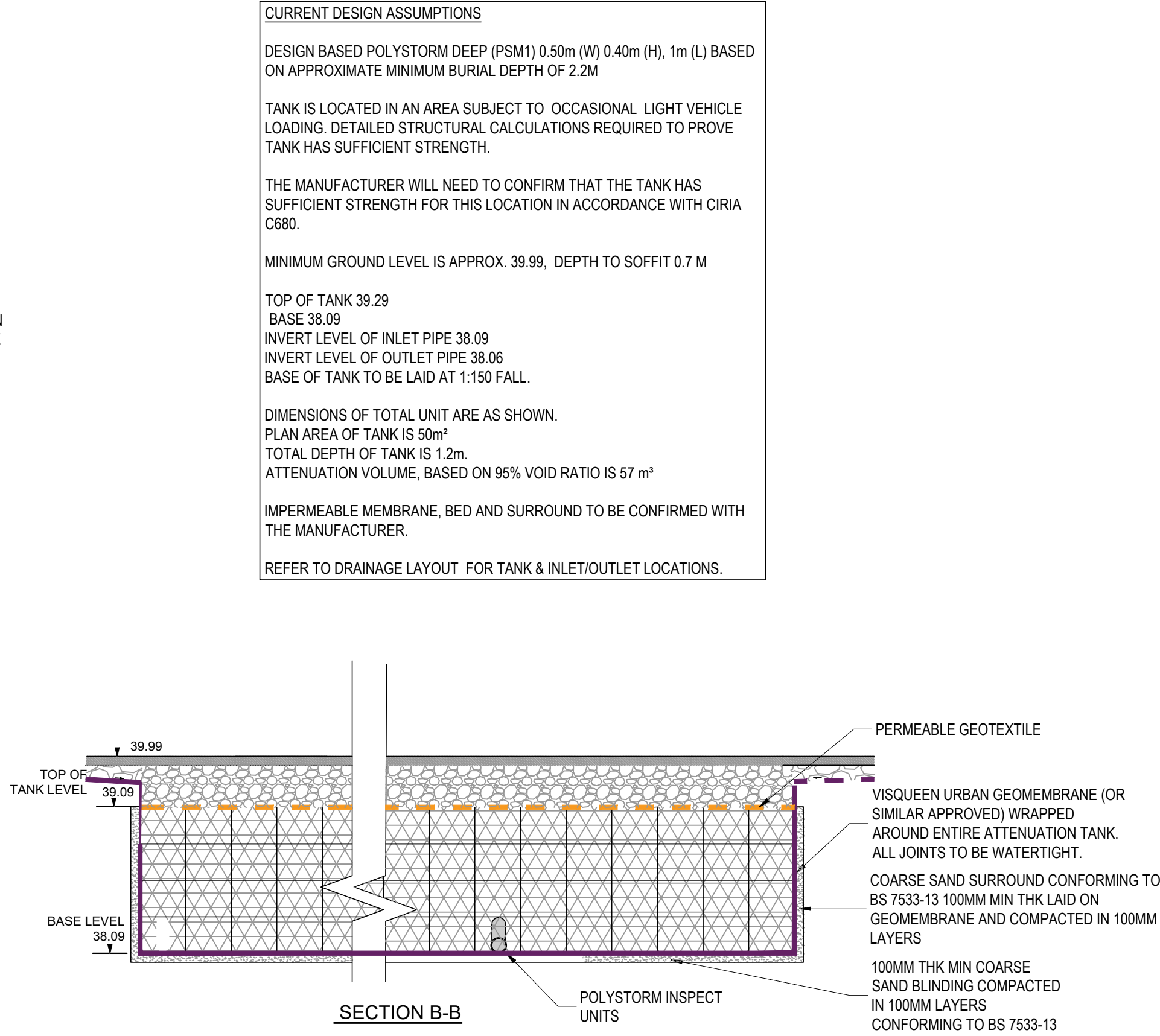
TYPICAL
ATTENUATION TANK
PLAN



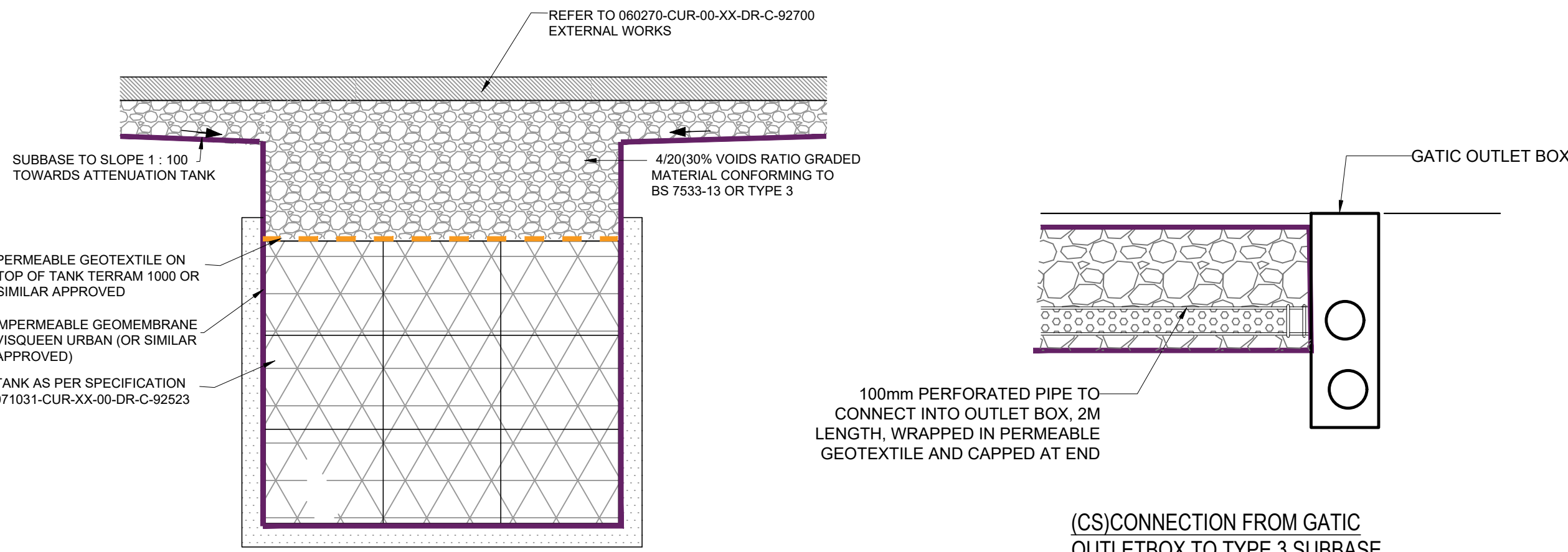
SECTION A-A



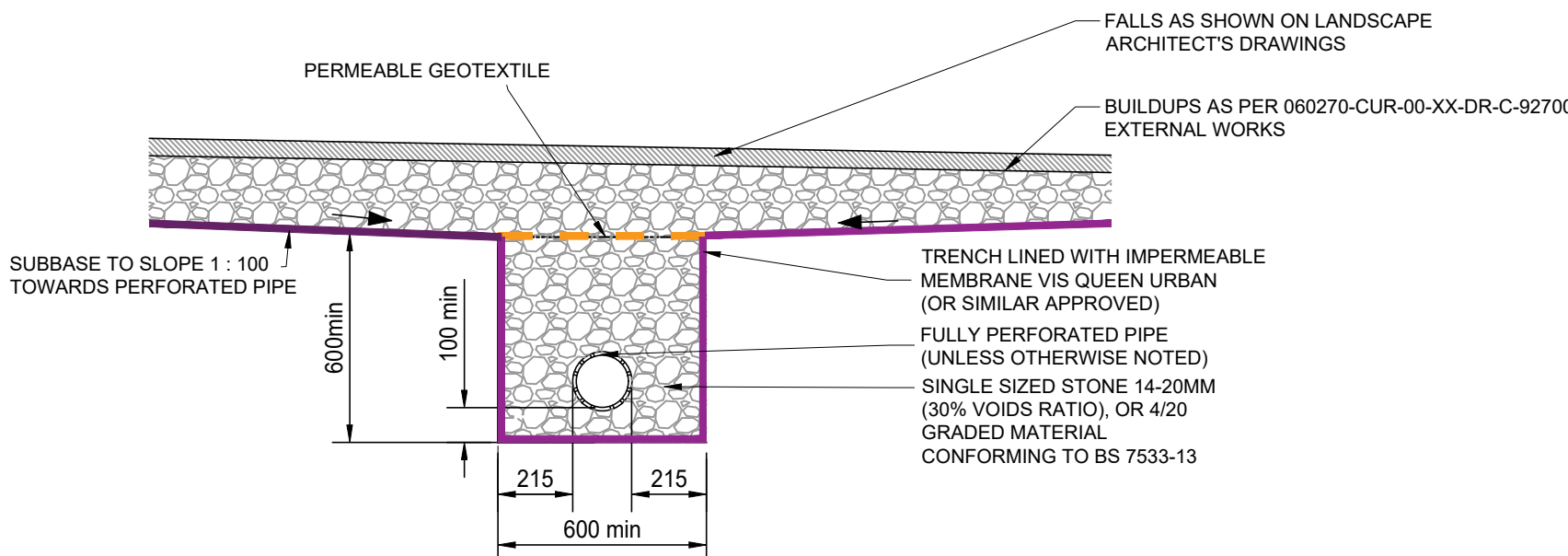
POLYPIPE POLYSTORM PSM1
ONE UNIT TYPICAL DETAILS



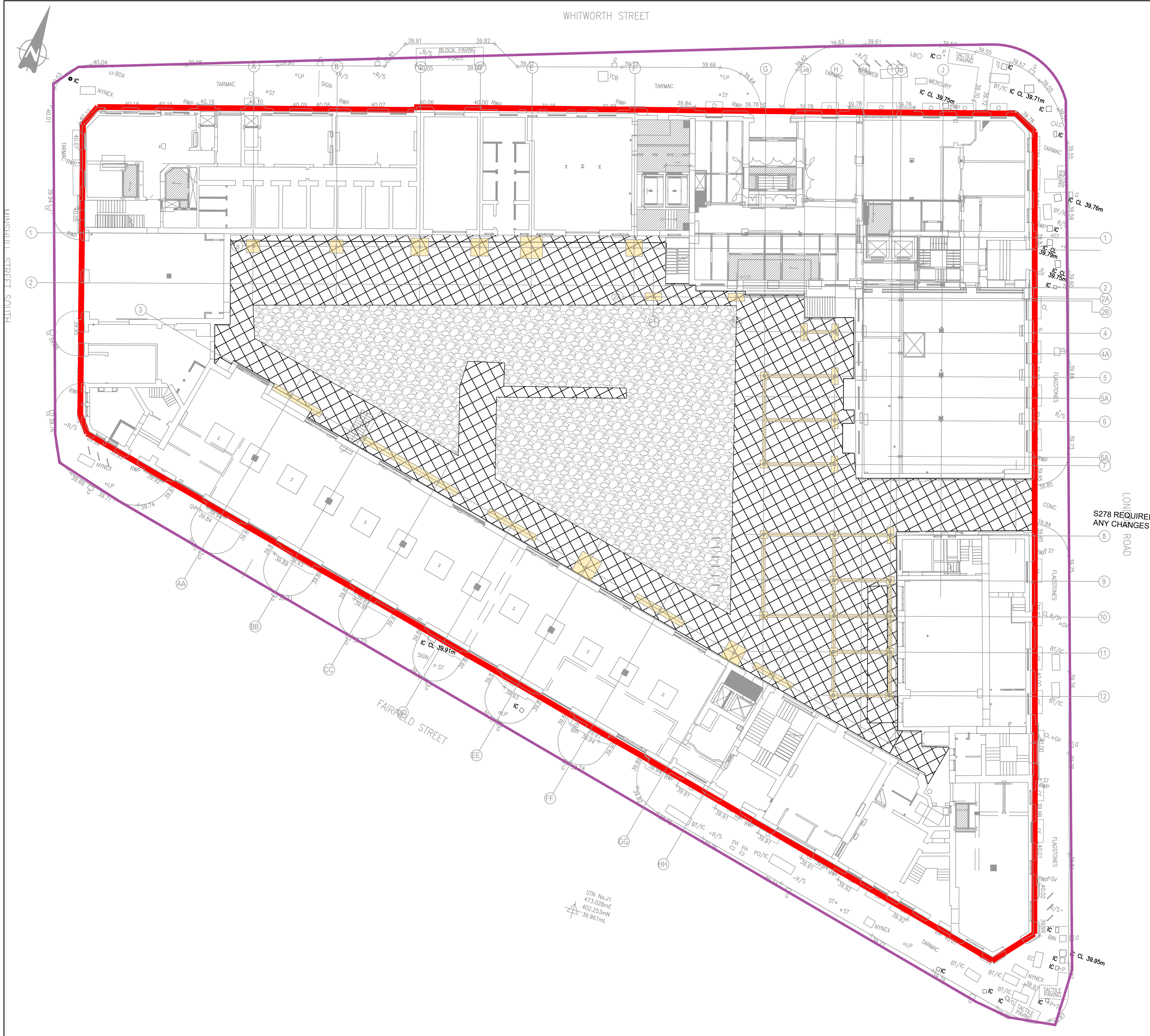
SECTION B-B



PAVEMENT WITH TYPE 3 SUBBASE
AND ATTENUATION TANK

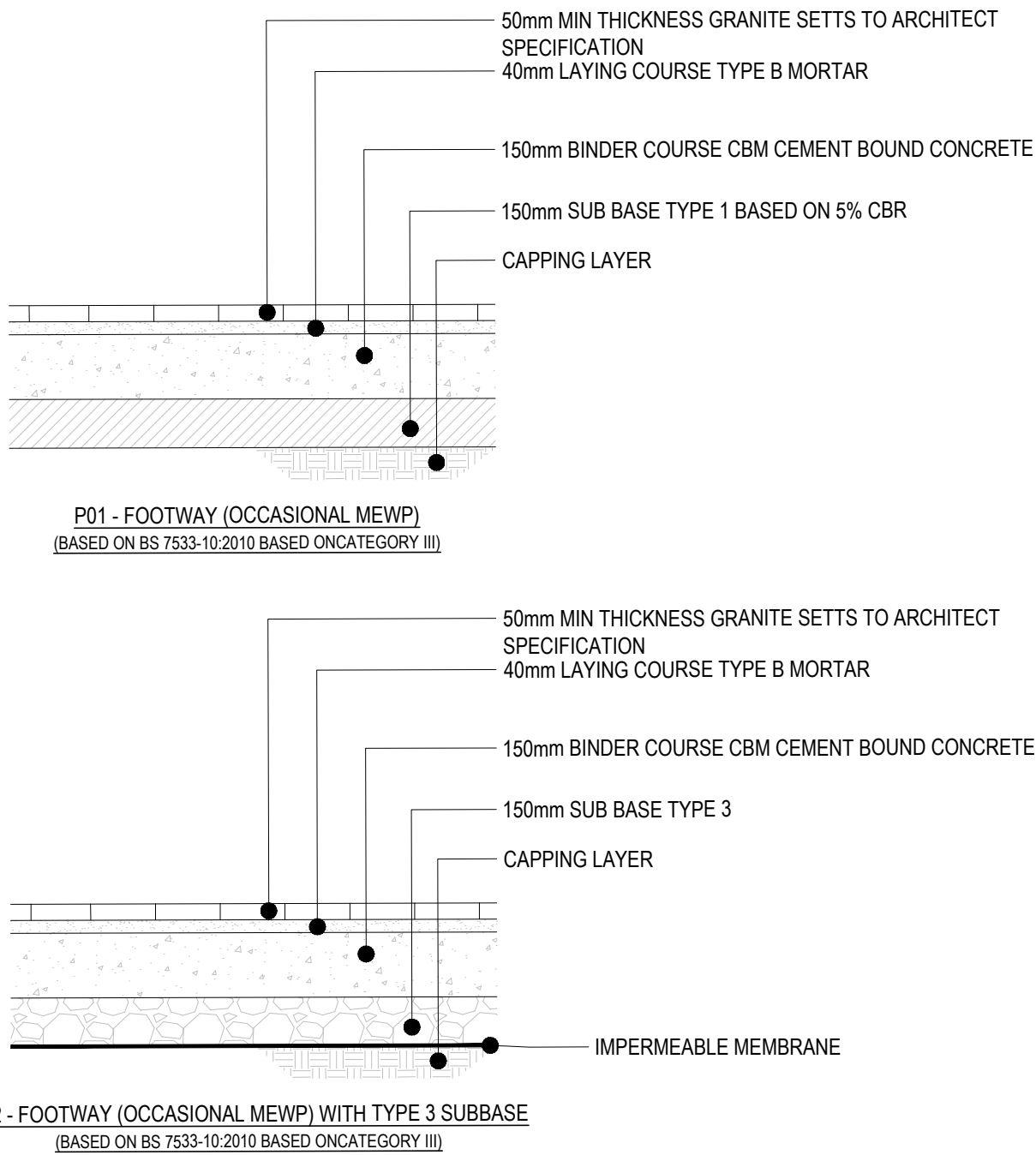


SUBBASE AND FILTER DRAIN DETAIL



KEY:

- SITE BOUNDARY TBC
- SECTION 278 BOUNDARY
- P01 - PROPOSED FOOTWAY (OCCASIONAL MEWP)
- P02 - PROPOSED FOOTWAY WITH TYPE 3 SUBBASE (OCCASIONAL MEWP)



DRAWING BASED ON:

GROUND LEVEL ARCHITECT LAYOUT: PURCELL, LRFS-PUR-01-00-DR-A-4120 REV 3
GPR SURVEY: LOCATE SURVEYS LTD, LSL:17499:200:1:1

EXTEND OF DETAIL P02, SUBJECT TO CHANGE EXTERNAL SERVICES STAGE 4 DRAWINGS TO BE PROVIDED.

GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
- ALL WORKS AND MATERIALS TO BE IN ACCORDANCE WITH CURRENT BRITISH STANDARDS AND BUILDING REGULATIONS.
- ALL SUB-BASES AND CAPPING LAYERS TO BE GRADED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS (SFHW).
- IT IS RECOMMENDED THAT CBR TESTS ARE CARRIED OUT TO CONFIRM AND SUB-BASE ADJUSTED IN ACCORDANCE WITH THE CAPPING AND SUB-BASE THICKNESS TABLE.
- CBR TEST PROCEDURE IS DETAILED WITHIN DMRB IAN73/06 AND BS 1377-4.
- MEASURED CBR VALUE TO BE AT FORMATION LEVEL AND TO BE A 'SOAKED' CONDITION.
- ANY VARIATIONS IN GROUND CONDITIONS SHOULD BE NOTIFIED TO THE ENGINEER PRIOR TO CONSTRUCTION.
- THE CONSTRUCTION DEPTHS GIVEN ARE THE MINIMUM REQUIRED (COMPACTED).
- THE CONSTRUCTION DEPTHS GIVEN ASSUME FORMATION IS NON-FROST SUSCEPTIBLE.
- WHERE FORMATION IS FROST SUSCEPTIBLE PROVIDE CAPPING MATERIAL TO GIVE A MINIMUM 450mm OVERALL CONSTRUCTION THICKNESS.
- THE CONSTRUCTIONS GIVEN ARE FOR PRIVATE AREAS ONLY AND NOT FOR ADOPTABLE AREAS.
- EXTENT OF HIGHWAY BOUNDARY TO BE CONFIRMED PRIOR TO COMMENCEMENT OF WORKS.
- IN AREAS WHERE LEVELS ARE TO BE RAISED, ACCEPTABLE FILL MATERIAL IS TO BE USED TO THE UNDERSIDE OF THE PROPOSED CONSTRUCTION MAKE UP.
- NO REGULATING OR FILL MATERIAL HAS BEEN INCLUDED IN CONSTRUCTION BUILD UP. CONTRACTOR TO INCLUDE FOR REGULATING/FILL MATERIAL IN THEIR RATES.
- IN AREAS WHERE LEVELS ARE TO BE LOWERED, EXISTING CONSTRUCTION IS TO BE REMOVED (FULL DEPTH).
- CONTRACTOR TO ALLOW FOR CONTRACTION JOINTING WITHIN CONCRETE AREAS.
- TYPE 1 SUB-BASE IN ACCORDANCE WITH SFHW.
- MAINTENANCE VEHICLE ROUTE TO BE CONFIRMED.
- EXTERNAL WORKS DRAWING BASED ON CURRENT ARCHITECT LAYOUT THIS IS SUBJECT TO CHANGE FOLLOWING ARCHITECTS FINAL LAYOUT.
- SECTION 278 WILL BE REQUIRED WHERE WORKS ARE PROPOSED IN PUBLIC HIGHWAYS/FOOTWAYS, EXTENT OF THESE WORKS TO BE CONFIRMED. CURRENT S278 BOUNDARY IS BASED ON DESIGN AND ACCESS STATEMENT (APRIL 2017) AND SUBJECT TO CHANGE FOLLOWING FINAL ARCHITECT LAYOUT.

P02	STAGE 4	14.10.20	MW	MW
P01	PLANNING ISSUE	31.01.20	OJT	MW
Rev:	Description:	Date:	By:	Chkd:

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Status: STAGE 3				
Project: LONDON ROAD FIRE STATION				
Orig Title: EXTERNAL WORKS LAYOUT				
Size: A1	Date: 31/01/20	Drawn By: OJT	Designed By: OJT	Checked By: MW
Scale: 1:200				
Project No: 060270	Originator: CUR	Volume: 00	Level: XX	Type: DR
				Role: C
				Category / Number: 92700
				Rev: P02

Appendix B – Exploratory Hole Logs

- Exploratory Hole Logs

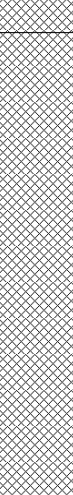
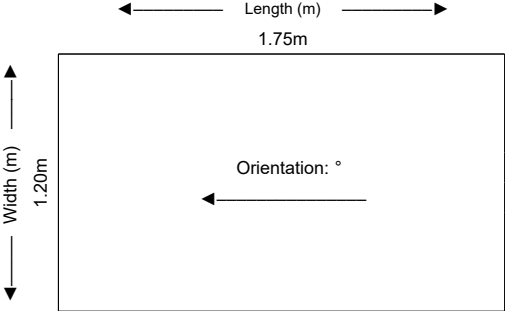
		Contract Name: London Road Fire Station, Manchester		Client: Allied London			Borehole ID: WS03						
		Contract Number: 41953	Date Started: 31/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1						
Dynamic Sample Borehole Log		Easting:		Northing:		Ground Level:		Plant Used:		Print Date: 02/11/2016		Scale: 1:50	
Weather:				Termination:				SPT Hammer: N/R, Energy Ratio: N/R					
Samples & In Situ Testing				Strata Details							Groundwater		
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description					Water Strike	Backfill/Installation	
				0.05		MADEGROUND: Brick.							
				0.24		MADE GROUND: Concrete.							
0.40	D7			(0.36)		MADE GROUND: Brown, dark brown, sandy, angular to subrounded, fine to coarse GRAVEL including brick, ash, coal and concrete.							
0.40	ES9			0.60		Stiff, brown, mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse including sandstone, siltstone, limestone, quartzite and occasional coal.					1		
0.80	D6	SPT(S) N=22 (3,4/5,5,6,6)											
0.80	ES8												
1.00													
1.50	D5												
2.00		SPT(S) N=27 (4,6/6,6,7,8)		(3.00)							2		
2.50	D4												
3.00		SPT(S) N=40 (6,6/10,7,11,12)									3		
3.50	D3			3.60									
3.60		SPT(S) 50 (27 for 135mm/50 for 115mm)		(0.45)		Dense, reddish brown, fine to coarse SAND (Possible weathered sandstone).					4		
3.80 - 4.05	D2			4.05		End of Borehole at 4.05m							
											5		
											6		
											7		
											8		
											9		
											10		
Borehole Diameter		Installation				Remarks:							
Depth (m)	Dia (m)	Depth Top	Base (m)	Diameter	Pipe Type	Service inspection pit hand excavated from GL to 1.20m.							
		0.00	0.20		PLAIN								
		0.20	1.00		PLAIN								
		1.00	3.50		SLOTTED								
Water Strikes													
Depth Strike	Depth Casing	Depth Sealed	Time (mins)	Rose to (m)	Remarks								
IFA DS Template Issue Number: 3 Issue Date: 07-09-16													

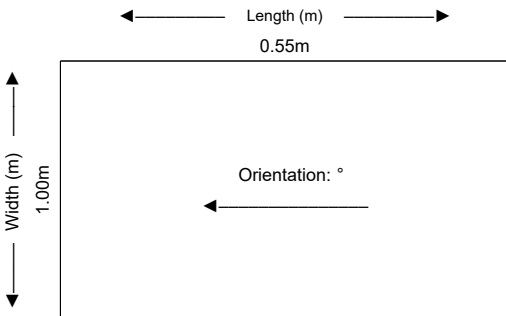
	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Borehole ID: BH01	
	Contract Number: 41953	Date Started: 26/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT		
Cable Percussion Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Print Date: 02/11/2016	Sheet 1 of 1	
					Scale: 1:50		
Weather:		Termination:		SPT Hammer: N/R, Energy Ratio: N/R			
Samples & In Situ Testing			Strata Details				Groundwater
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike
0.20	D2	SPT(S) N=14 (2,3/3,4,3,4)		0.20		MADE GROUND: Concrete.	
0.20	ES1			(1.10)		MADE GROUND: Dark brown grey, sandy, angular to subrounded, fine to coarse GRAVEL with medium cobble content. Including brick, concrete and sandstone.	
0.50 - 1.00	B3						
1.00	D5	SPT(S) N=13 (2,3/3,3,4,3)		1.30		MADE GROUND: Firm, dark brown, sandy, very gravelly CLAY. Gravel is angular to subrounded, fine to coarse including brick, ash, concrete, sandstone and occasional wood.	1
1.00	ES4			(0.80)			
1.20	B6						
1.20 - 1.65	D8	SPT(S) N=48 (7,7/7,9,13,19)		2.10		Firm, brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine and medium including sandstone, siltstone, limestone, occasional quartzite and coal.	2
1.70	ES7						
2.00	B9						
2.00 - 2.45	ES10	115 blows. 100% recovery		(1.60)		Below 3.00m: stiff and very high strength.	3
2.70	U12						
3.00 - 3.45	D13						
3.50	D14	SPT(S) N=48 (7,7/7,9,13,19)		3.70		Dense, reddish brown, silty, sandy, subangular to rounded, fine and coarse GRAVEL including sandstone, siltstone, limestone, occasional quartzite and coal.	4
3.70	D14						
4.00	B15						
4.00 - 4.45	D16	SPT(S) 50 (10,11/50 for 220mm)		(1.90)			5
4.00 - 4.45	B15						
5.00	D19						
5.00 - 5.45	D18	SPT(S) 50 (25 for 87mm/50 for 147mm)		5.60		Weathered SANDSTONE recovered as, dense red brown, slightly gravelly, fine to coarse sand. Gravel is subangular to subrounded, fine to coarse including sandstone.	6
5.00 - 5.45	D18						
5.60	B20						
6.00	D21	SPT(S) 50 (25 for 85mm/50 for 85mm)		(2.40)			7
6.00 - 6.45	B20						
6.00 - 6.45	D21						
7.00	D22	SPT(S) 50 (25 for 85mm/50 for 85mm)		8.00		End of Borehole at 8.00m	8
7.50	B23						
7.50 - 7.67	D24						
7.50 - 7.67							9
							10
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	
					8.00	150	Service inspection pit hand excavated from GL to 1.20m.
Chiselling			Installation		Water Strikes		
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)
5.00	5.00	00:30		0.00	3.00	PLAIN	
7.70	8.00	01:00		3.00	5.00	SLOTTED	
					Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks		
					0		
IFA CP Template Issue Number: 5 Issue Date: 04/10/16							

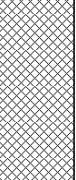
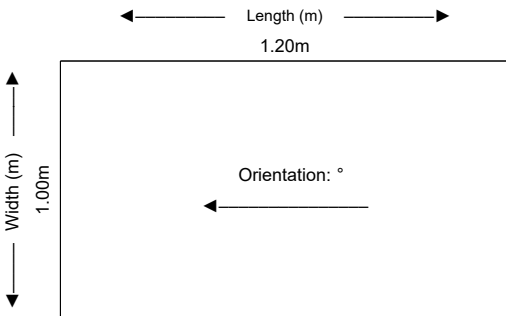
		Contract Name: London Road Fire Station, Manchester			Client: Allied London			Borehole ID: BH02						
		Contract Number: 41953	Date Started: 30/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT								
Cable Percussion Borehole Log		Easting:		Northing:	Ground Level:	Plant Used:	Print Date: 02/11/2016	Sheet 1 of 2						
								Scale: 1:50						
Weather:				Termination:			SPT Hammer: N/R, Energy Ratio: N/R							
Samples & In Situ Testing				Strata Details					Groundwater					
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation				
0.20	ES1			0.07		MADE GROUND: Brick paving.								
0.50 - 1.00	B2			0.20		MADE GROUND: Concrete.								
0.70	ES3					MADE GROUND: Dark brown, slightly clayey, sandy, angular to subrounded fine to coarse GRAVEL with medium cobble content., including brick, ash, concrete, sandstone and occasional wood.								
1.20		SPT(S) N=20 (3,5/5,4,5,6)		(1.60)					1					
1.20 - 1.65	B4													
1.70	ES5			1.80		Stiff, brown, slightly mottled grey, slightly sandy, slightly gravelly CLAY with medium cobble content. Gravel is subangular to rounded, fine and medium including sandstone. siltstone, limestone, occasional wood.			2					
1.80	D6	120 blows. 100% recovery												
2.00 - 2.45	U7													
2.50	D8			(1.80)										
2.70	ES9													
3.00		SPT(S) N=34 (4,5/6,8,10,10)							3					
3.00 - 3.45	B10													
3.00 - 3.45	D11													
3.60	D12			3.60		Dense, reddish brown, silty, sandy, subangular to rounded, fine and coarse GRAVEL with clay bands including sandstone, siltstone, limestone, occasional quartzite and coal.			4					
4.00		SPT(S) N=39 (5,8/8,9,10,12)												
4.00 - 4.45	B13													
5.00		SPT(S) N=43 (6,7/9,10,11,13)							5					
5.00 - 5.45	B14													
6.00		SPT(S) 53 (8,11/53 for 180mm)		(5.00)					6					
6.00 - 6.33	B15													
6.00 - 6.33	D16													
6.80	D17								7					
7.50		SPT(C) 50 (25 for 95mm/50 for 130mm)												
7.50 - 7.91	B18								8					
8.60	D19			8.60		Weathered SANDSTONE recovered as very dense, reddish brown, slightly gravelly, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including sandstone.			9					
9.00		SPT(S) 50 (25 for 35mm/50 for 60mm)		(1.40)										
9.00 - 9.10	D20													
				10.00					10					
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:							
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Service inspection pit hand excavated from GL to 1.20m. Chiselling: 9.70m to 10.00m = 1hr					
					10.00	150	9.00	150						
					Water Strikes									
Chiselling					Installation				Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)						
6.20	6.50	01:15			0.00	9.00	PLAIN							
6.90	7.20	01:00			9.00	12.00	SLOTTED							
7.60	7.00	01:30												
IFA CP Template Issue Number: 5 Issue Date: 04/10/16														

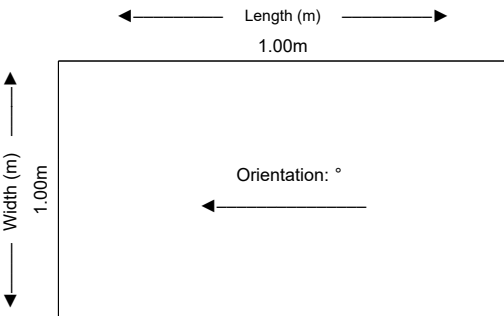
		Contract Name: London Road Fire Station, Manchester				Client: Allied London				Borehole ID: BH02				
		Contract Number: 41953		Date Started: 30/08/2016		Logged By: JM		Checked By: HH				Status: DRAFT		
Rotary Core Drilling Log		Easting:		Northing:		Ground Level:		Plant Used:		Print Date: 02/11/2016		Scale: 1:50		
		Weather:				Termination:				SPT Hammer: N/R, Energy Ratio: N/R				
Coring Details					Strata Details							Groundwater		
Depth	TCR	SCR	RQD	Fracture Spacing	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation	
10.00 - 11.50	67	41	0	10		(1.00)		Extremely weak, thinly bedded, reddish brown, medium and coarse grained SANDSTONE. Distinctly weathered. Subhorizontal (80 to 85 degrees), very closely spaced, undulating, rough, moderately open to open, sand infilled discontinuities. At 10.15m, 10.16m, 10.42m, 10.75m and 10.80m, drilling induced fractures.				11		
				11.00		Extremely weak, thinly bedded, reddish brown, medium and coarse grained SANDSTONE. Distinctly weathered. Horizontal to subhorizontal (80 to 90 degrees), closely spaced, undulating, rough, moderately open to open, sand infilled discontinuities. Between 11.00m to 12.20m: assumed zone of core loss.								
11.50 - 13.00	53	15	8	NR		(6.00)						12		
				NI			At 12.20m: non intact recovered as gravel.							
				18							13			
				12										
13.00 - 14.50	89	25	0					At 13.48m: non intact recovered as gravel.				14		
				26										
				NI			At 14.07m: non intact recovered as gravel.							
				15			Between 14.33m and 16.15m: assumed zone of core loss.							
14.50 - 16.00	0	0	0	NR	17.00							15		
16.00 - 17.00	85	31	11	NI			At 16.15m: non intact recovered as gravel.				16			
				18										
				6		At 16.81m: very weak								
				25		At 16.91m: non intact recovered as gravel.								
									End of Borehole at 10.000m				17	
													18	
												19		
												20		
Start & End of Shift Observations					Borehole Diameter				Casing Diameter				Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Service inspection pit hand excavated from GL to 1.20m. Chiselling: 9.70m to 10.00m = 1hr					
					10.00	150	9.00	150						
									Water Strikes					
									Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Flush Information					Installation									
Top (m)	Base (m)	Flush Type	Return	Flush Colour	Top (m)	Base (m)	Type	Dia (mm)	Fracture spacing as FI or Min, Average and Max in mm. TCR, SCR and RQD reported in %					
					0.00	9.00	PLAIN							
					9.00	12.00	SLOTTED							
IFA RC Issue Number: 2 Issue Date: 13/07/16														

	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Borehole ID: BH03							
	Contract Number: 41953	Date Started: 25/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT								
Cable Percussion Borehole Log	Easting:	Northing:	Ground Level:	Plant Used:	Print Date: 02/11/2016	Sheet 1 of 1							
					Scale: 1:50								
Weather:		Termination:		SPT Hammer: N/R, Energy Ratio: N/R									
Samples & In Situ Testing			Strata Details				Groundwater						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike						
0.20 0.20 - 0.70	ES1 B2			(0.30) 0.30		MADE GROUND: Brown, sandy, angular to subrounded, fine to coarse GRAVEL including brick, concrete, occasional sandstone and wood with medium cobble content.	1						
0.70	ES3					MADE GROUND: Very soft, dark brown, sandy, very gravelly CLAY with low cobble content. Gravel is angular to subrounded, fine to coarse including brick, ash, occasional concrete, sandstone and wood.							
1.20 1.20 - 1.65	B4	SPT(S) N=1 (1,0/0,0,1,0)		(2.40)			2						
1.70	ES5												
2.00 2.00 - 2.45	B6	SPT(S) N=2 (1,0/1,0,0,1)					3						
2.70 2.70	D8 ES7 U9	63 blows. 100% recovery				Firm, brown, slightly mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine and medium including sandstone, siltstone, limestone, occasional quartzite and coal. <i>At 3.00m: very high strength</i>							
3.00 - 3.45				(1.30)			4						
3.50	D10												
4.00 4.00 - 4.45 4.00 - 4.45	B11 D12	SPT(S) N=11 (2,2/3,3,3,2)		4.00		Medium dense, reddish brown, silty, fine and medium SAND with clay bands.	5						
5.00 5.00 - 5.45 5.00 - 5.45	B13 D14	SPT(S) N=14 (2,3/3,4,4,3)		(1.90)									
6.00 6.00 - 6.20 6.00 - 6.20	B15 D16	SPT(S) 50 (25 for 100mm/50 for 100mm)		5.90		Weathered SANDSTONE recovered as, dense, reddish brown yellow, slightly gravelly, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including sandstone.	6						
7.00	D17			(2.10)									
7.50 7.50 - 7.70 7.50 - 7.70	B18 D19	SPT(S) 50 (25 for 100mm/50 for 100mm)		8.00	End of Borehole at 8.00m		7						
							8						
							9						
							10						
Start & End of Shift Observations			Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)		Depth (m)	Dia (mm)				
					8.00	150	7.50	150	Service inspection pit hand excavated from GL to 1.20m.				
Chiselling			Installation		Water Strikes								
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
7.70	8.00	01:00		0.00	0.20	PLAIN							
				0.20	1.00	PLAIN							
				1.00	6.00	SLOTTED							
IFA CP Template Issue Number: 5 Issue Date: 04/10/16													

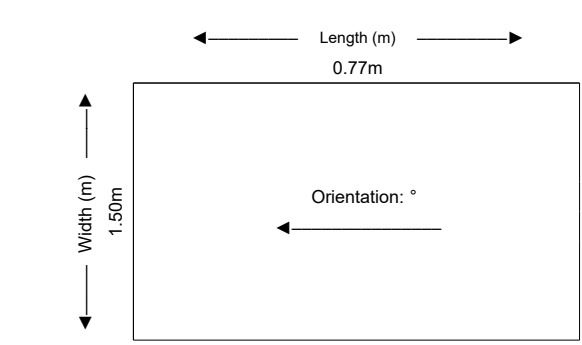
	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: HP01														
	Contract Number: 41953	Date: 22/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1														
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: Hand excavated	Date Printed: 02/11/2016	Scale: 1:40														
	Weather:		Hole Termination:		Stability: Hand pit remained dry and stable during excavation															
Samples & In Situ Testing			Strata Details					Water												
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description														
0.20 - 1.00	B2			0.20		MADE GROUND: Concrete.		1												
0.50	ES1			(2.45)		MADE GROUND: Brown, very sandy, angular to subrounded, fine to coarse GRAVEL with high cobble contents. Including concrete, brick, sandstone, siltstone and occasional wood.														
1.50	D5							2												
1.50	ES3							3												
1.50 - 2.50	D4			2.65		End of Trial Pit at 2.65m		4												
								5												
								6												
Dimensions:			General Remarks:																	
Final Depth: 2.65m			Refer to sketch for further details.																	
																				
			<table><tr><td colspan="4">Water Strikes</td></tr><tr><td>Strike (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>						Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																				
Strike (m)	Time (mins)	Rose to (m)	Remarks																	
			HBSI TP Template Issue Number: 2 Issue Date: 27/04/16																	

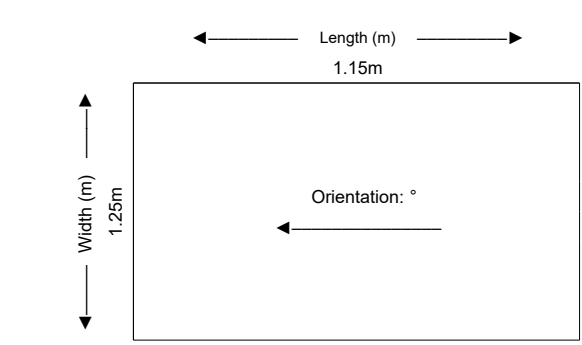
	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: HP03										
	Contract Number: 41953	Date: 24/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1										
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed: 02/11/2016	Scale: 1:40										
	Weather:		Hole Termination:		Stability: Hand excavated.											
Samples & In Situ Testing			Strata Details					Water								
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description										
0.13 - 0.30	D3			0.13		MADE GROUND: Concrete.		1								
0.30 - 0.70	B2			0.30		MADE GROUND: Orangish brown, sandy, angular to subrounded, fine to coarse GRAVEL with low cobble content. including brick, concrete .										
0.70 - 1.46	B1			(0.40)		Stiff, greyish brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse including sandstone, siltstone and quartzite.										
				0.70		Dense, brown, clayey, gravelly, fine to coarse SAND. Gravel is subangular to rounded, fine to coarse including sandstone, siltstone and quartzite.										
				(0.76)												
				1.46		End of Trial Pit at 1.46m		2								
								3								
								4								
								5								
								6								
Dimensions:					General Remarks:											
Final Depth: 1.46m					Refer to sketch for further details.											
																
					Water Strikes											
					<table><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Strike (m)	Time (mins)	Rose to (m)	Remarks													
					HBSI TP Template Issue Number: 2 Issue Date: 27/04/16											

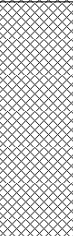
	Contract Name: London Road Fire Station, Manchester			Client: Allied London			Trial Pit ID: HP04												
	Contract Number: 41953	Date: 24/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1													
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: Hand excavated	Date Printed: 02/11/2016	Scale: 1:40													
	Weather:		Hole Termination:		Stability: Hand pit remained dry and stable during excavation.														
Samples & In Situ Testing			Strata Details					Water											
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description													
0.10 - 1.10	B1			0.10		MADE GROUND: Concrete.		1											
				(1.00)		MADE GROUND: Brown, very gravelly, fine to coarse SAND with low cobble content. Gravel is angular to subrounded, fine to coarse including brick, concrete, sandstone, plastic, occasional wood, plastic bags, cans and glass.													
1.10 - 1.40	B2			1.10 (0.30) 1.40		Extremely weathered SANDSTONE recovered as, reddish brown, slightly gravelly, fine to coarse sand. Gravel is subangular to subrounded, fine to coarse including sandstone.													
						End of Trial Pit at 1.40m		2											
								3											
								4											
								5											
								6											
Dimensions:			General Remarks:																
Final Depth: 1.40m			Refer to sketch for further details.																
																			
			<table><tr><th colspan="4">Water Strikes</th></tr><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>					Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																			
Strike (m)	Time (mins)	Rose to (m)	Remarks																
			HBSI TP Template Issue Number: 2 Issue Date: 27/04/16																

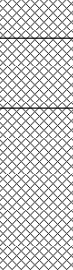
	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: HP06										
	Contract Number: 41953	Date: 23/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1										
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: Hand excavated	Date Printed: 02/11/2016	Scale: 1:40										
	Weather:		Hole Termination:		Stability: Hand pit remained dry and stable during excavation.											
Samples & In Situ Testing			Strata Details					Water								
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description										
0.10 - 0.33	B2			0.10		MADE GROUND: Concrete.		1								
0.33 - 1.00	B1			0.33		MADE GROUND: Grey, slightly sandy, angular to subrounded, fine to coarse GRAVEL with medium cobble content, including brick, concrete and sandstone.										
				(0.87)		Reddish brown, slightly gravelly, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including sandstone.										
				1.20		End of Trial Pit at 1.20m										
								2								
								3								
								4								
								5								
								6								
Dimensions:					General Remarks:											
Final Depth: 1.20m					Refer to sketch for further details.											
																
					Water Strikes											
					<table><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Strike (m)	Time (mins)	Rose to (m)	Remarks													
					HBSI TP Template Issue Number: 2 Issue Date: 27/04/16											

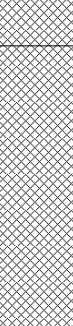
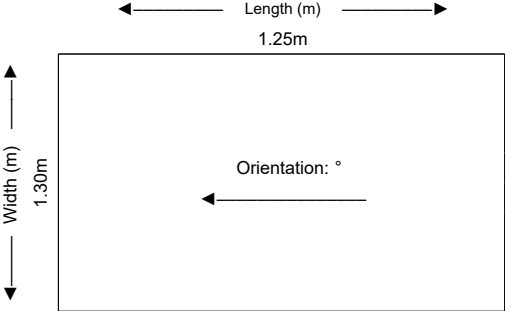
	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: HP07													
	Contract Number: 41953	Date: 25/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1													
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: Hand excavated	Date Printed: 02/11/2016	Scale: 1:40													
	Weather:		Hole Termination:		Stability: Hand pit remained dry and stable during excavation														
Samples & In Situ Testing			Strata Details					Water											
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description													
0.10 - 0.33	D3			0.10		MADE GROUND: Concrete.		1											
0.33 - 0.77	B2			0.33		MADE GROUND: Dark brown grey, sandy, angular to subrounded, fine to coarse GRAVEL with low cobble content. Including brick, concrete and occasional wood.													
0.77 - 1.20	D1			(0.44)		Stiff, greyish brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse including siltstone, sandstone and quartzite.													
				0.77		Reddish brown, slightly gravelly, fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including sandstone and extremely weathered sandstone (Weathered sandstone).													
				(0.43)															
				1.20		End of Trial Pit at 1.20m		2											
								3											
								4											
								5											
								6											
Dimensions:			General Remarks:																
Final Depth: 1.20m			Refer to sketch for further details.																
← Length (m) → 0.69m ↑ Width (m) ↓ 0.66m Orientation: ° ←			<table><tr><th colspan="4">Water Strikes</th></tr><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>					Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																			
Strike (m)	Time (mins)	Rose to (m)	Remarks																
HBSI TP Template Issue Number: 2 Issue Date: 27/04/16																			

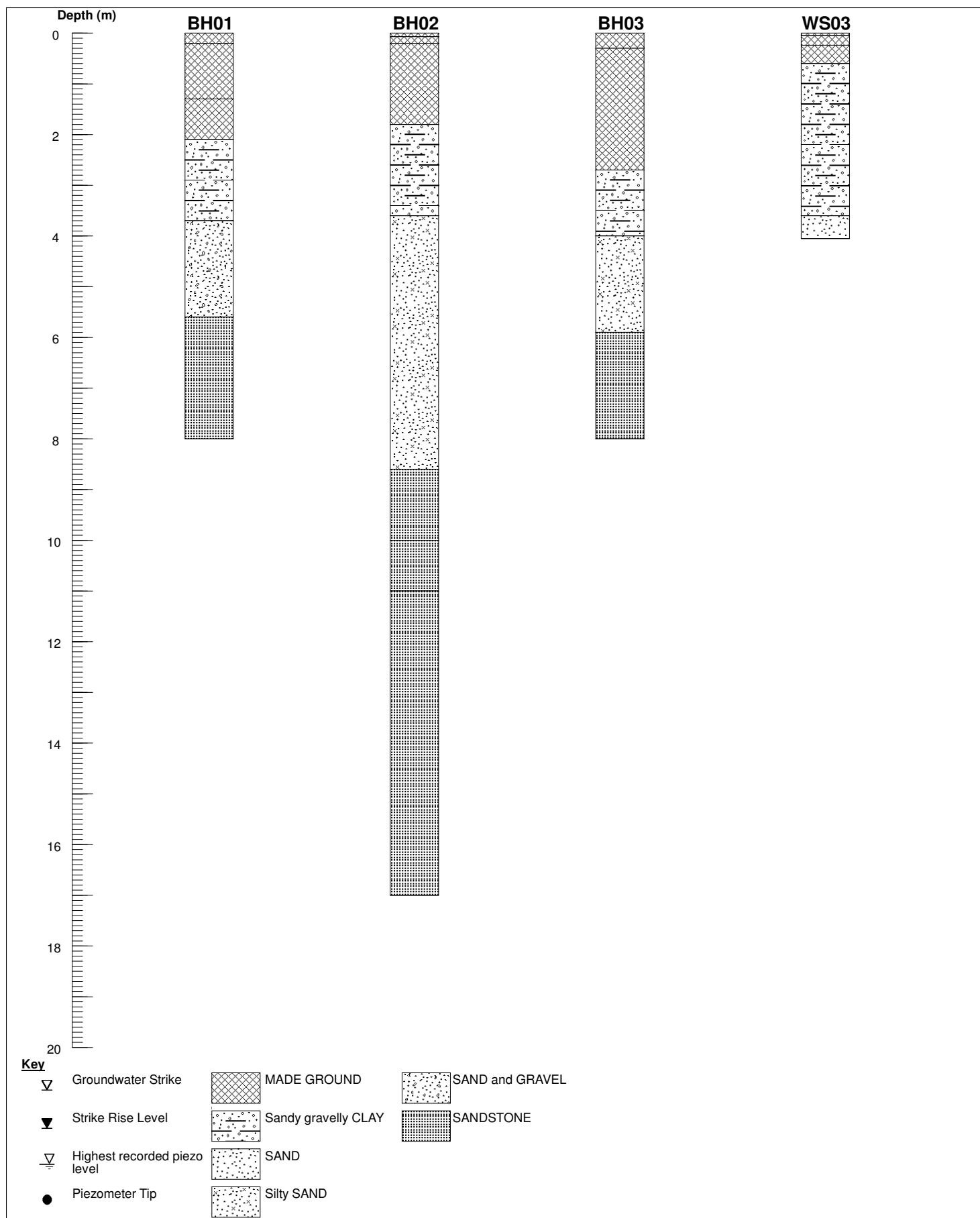
		Contract Name: London Road Fire Station, Manchester		Client: Allied London		Trial Pit ID: HP08	
		Contract Number: 41953	Date: 22/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1
Trial Pit Log		Easting:	Northing:	Ground Level:	Plant Used: Hand excavated	Date Printed: 02/11/2016	Scale: 1:40
		Weather:			Hole Termination:		Stability: Hand pit remained dry and stable during excavation.
Samples & In Situ Testing				Strata Details			Water
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	
0.20 - 0.30	B1			0.12		MADE GROUND: Concrete.	1
0.40 - 0.70	B2			0.35		MADE GROUND: Brown, slightly clayey, sandy, angular to subrounded, fine to coarse GRAVEL with medium cobble content. Including concrete, brick, occasional wood and ash.	
0.70 - 1.50	B3			(0.35)		Firm, brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse including sandstone and siltstone.	2
				0.70		Brown, slightly gravelly, fine to coarse SAND. Gravel is subangular to subrounded, fine and medium including sandstone.	
				(1.20)			3
				1.90		End of Trial Pit at 1.90m	4
							5
							6
Dimensions:				General Remarks:			
Final Depth: 1.90m				Refer to sketch for further details.			
				Water Strikes			
				Strike (m)	Time (mins)	Rose to (m)	Remarks

		Contract Name: London Road Fire Station, Manchester		Client: Allied London		Trial Pit ID: TP01	
		Contract Number: 41953	Date: 05/09/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1
Trial Pit Log		Easting:	Northing:	Ground Level:	Plant Used: 1 ton tracked excavator	Date Printed: 02/11/2016	Scale: 1:40
		Weather:			Hole Termination:		Stability: Trial pit remained dry and stable during excavating
Samples & In Situ Testing				Strata Details			Water
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	
				0.05		MADE GROUND: Concrete.	
				0.25		MADE GROUND: Brown, slightly clayey, gravelly, fine to coarse SAND with low cobble content. Gravel is angular to subangular, fine to coarse including brick, concrete, mudstone and coal.	
0.50 0.50 0.70	D2 ES1 B3					MADE GROUND: Firm, brown, mottled blackish red, sandy, gravelly CLAY. With low cobble content. Gravel is angular to subangular, fine to coarse including brick, concrete, mudstone, ceramic and coal.	
1.00	ES4			(1.75)			1
1.70	B5						
2.00 2.00	D7 ES6			2.00		End of Trial Pit at 2.00m	2
							3
							4
							5
							6
Dimensions:				General Remarks:			
Final Depth: 2.00m				No foundations encountered.			
							
				Water Strikes			
				Strike (m)	Time (mins)	Rose to (m)	Remarks
HBSI TP Template Issue Number: 2 Issue Date: 27/04/16							

	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: TP02													
	Contract Number: 41953	Date: 01/09/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1													
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: 1 ton tracked excavator	Date Printed: 02/11/2016	Scale: 1:40													
	Weather:		Hole Termination:		Stability:														
Samples & In Situ Testing				Strata Details				Water											
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description													
0.18 - 1.00	B1			0.18		MADE GROUND: Concrete with rebar.		1											
0.50	ES2			(1.30)		MADE GROUND: Firm, dark brown, sandy, gravelly CLAY with medium cobble content. Gravel is angular to subrounded, fine to coarse including brick, ash, concrete, slab and sandstone.													
1.48 - 2.00	B3			1.48		MADE GROUND: Stiff, brown, mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine and medium including sandstone, siltstone, limestone, brick, concrete and coal (Reworked natural).			2										
1.50	ES4	(0.52)	End of Trial Pit at 2.00m																
				2.00				3											
								4											
								5											
								6											
Dimensions:				General Remarks:															
Final Depth: 2.00m				Refer to sketch for further details.															
← Length (m) → 1.30m ↑ Width (m) ↓ 1.20m Orientation: ° ←																			
				<table><tr><td colspan="4">Water Strikes</td></tr><tr><td>Strike (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>				Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																			
Strike (m)	Time (mins)	Rose to (m)	Remarks																
				HBSI TP Template Issue Number: 2 Issue Date: 27/04/16															

	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: TP03														
	Contract Number: 41953	Date: 01/09/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1														
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: 1 ton tracked excavator.	Date Printed: 02/11/2016	Scale: 1:40														
	Weather:		Hole Termination:		Stability: Trial pit remained dry and stable during excavation															
Samples & In Situ Testing			Strata Details					Water												
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description														
				0.23		MADE GROUND: Concrete with rebar.		1												
0.50 0.60	D1 ES2			(0.37) 0.60		MADE GROUND: Dark grey, dark brown, slightly clayey, very sandy, angular to subrounded, fine to coarse GRAVEL with medium cobble content. Including brick, concrete, ash and slate.														
1.00	B3			(0.93)		MADE GROUND: Dark brown, soft, sandy, gravelly CLAY with low cobble content. Gravel is angular to subrounded, fine to coarse including brick, concrete, ash and slate.														
1.60 1.60	B4 ES5			1.53 1.70		Stiff, brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine and medium including limestone, siltstone, sandstone, occasional quartzite and coal.		2 3 4 5 6												
						End of Trial Pit at 1.70m														
Dimensions:			General Remarks:																	
Final Depth: 1.70m			Refer to sketch for further details.																	
← Length (m) → 1.29m ↑ Width (m) ↓ 1.27m Orientation: ° ←																				
			<table><tr><th colspan="4">Water Strikes</th></tr><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>						Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																				
Strike (m)	Time (mins)	Rose to (m)	Remarks																	
			HBSI TP Template Issue Number: 2 Issue Date: 27/04/16																	

	Contract Name: London Road Fire Station, Manchester		Client: Allied London			Trial Pit ID: TP04														
	Contract Number: 41953	Date: 30/08/2016	Logged By: JM	Checked By: HH	Status: DRAFT	Sheet 1 of 1														
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: 1 ton tracked excavator	Date Printed: 02/11/2016	Scale: 1:40														
	Weather:		Hole Termination:		Stability:															
Samples & In Situ Testing			Strata Details					Water												
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description														
0.27 - 1.76	B1			0.27		MADE GROUND: Concrete.		1												
				(1.49)		MADE GROUND: Orangish brown, sandy, angular to subrounded, fine to coarse GRAVEL including brick, concrete, occasional wood and clinker.														
1.50	D2			1.76		End of Trial Pit at 1.76m		2												
								3												
								4												
								5												
								6												
Dimensions:			General Remarks:																	
Final Depth: 1.76m			Concrete encountered at 1.76m. Refer to sketch for further details.																	
																				
			<table><tr><th colspan="4">Water Strikes</th></tr><tr><th>Strike (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td></td><td></td><td></td><td></td></tr></table>						Water Strikes				Strike (m)	Time (mins)	Rose to (m)	Remarks				
Water Strikes																				
Strike (m)	Time (mins)	Rose to (m)	Remarks																	
			HBSI TP Template Issue Number: 2 Issue Date: 27/04/16																	



Nominal Section: Strata from Ground Level

Site London Road Fire Station, Manchester	Date Drawn 08/11/2016	Date Checked	Sheet 1/1	Job Number 41953
Client Allied London	Drawn By	Checked By	Scale 1:100[V]	Figure No. Figure A1.3

Appendix C – Risk Assessment Rationale

The qualitative risk assessment of environmental harm is designed to establish connecting links between a hazardous source to a potential receptor via an exposure pathway.

The qualitative risk assessment corresponds with the proposed piling operations on site.

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the hazardous source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of hazard on a site does not necessarily mean there is a risk.

By considering where a viable pathway exists which connects a source with a receptor the risk assessment in Section 3.0 and Table A4.1 identifies where pollutant linkage exists. If there is no pollutant linkage there is no risk and only where a pollutant linkage is established does the risk assessment, consider the level of risk.

The risk assessment considers the likelihood of a particular event taking place (accounting for the presence of the hazard and receptor and the integrity of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances actually occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Piling Risk Assessment

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

Piling Risk Assessment

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation or risk management operations.

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