Our Ref; TN/2-079
14 July 2025

152-154 UXBRIDGE ROAD

HAYES (UB4 0JH)

DRAINAGE TECHNICAL NOTE

Purpose

This Technical note has been prepared to discharge planning condition 19 as stated on Hillingdon Application Report, (ref. 4482/APP/2022/213), recreated as follows;

No development approved by this permission shall be commenced until a scheme for the provision of sustainable water management and water efficiency has been submitted to and approved in writing by the Local Planning Authority. The scheme shall:

I. Provide information about the design storm period and intensity, the method employed to delay and control the surface water discharged from the site and the measures taken to prevent pollution of the receiving groundwater and/or surface waters;
II. Include a timetable for its implementation; and
III. Provide a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime.

The scheme shall also demonstrate the use of methods to minimise the use of potable water through water collection, reuse and recycling and will:

IV. Provide details of water collection facilities to capture excess rainwater;
V. Provide details of how rain and grey water will be recycled and reused in the development;
VI. Provide details of how the dwellings will achieve a water efficiency standard of no more than 110 litres per person per day maximum water consumption.

Thereafter the development shall be implemented and retained/maintained in accordance with these details for as long as the development remains in existence.

Surface Water Drainage Disposal

Part H of the Building Regulations (2010) recommends surface water run-off shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
- A watercourse, or, where that is not reasonably practicable,
- A sewer.

Each disposal mechanism in turn has been reviewed in context of the development site;

Infiltration Disposal

BRE 365 Soakaway Testing was conducted by Geofirma in March 2025 (ref. 2024-065-PRE-UXB_REP001_REV01). The report provides the following information;

Soakaway Test SA1 identified SILT 1.30m thick. The water level dropped from 20mm in 5 hours. An infiltration rate could not be calculated.

Soakaway Test SA2 identified RIVER TERRACE DEPOSITS 2.8m thick. The water level did not drop in 5 hours. An infiltration rate could not be calculated.

The Report also states the following:

'It is noted that River Terrace Deposits would typically be favourable for infiltration, however this was not observed during the infiltration testing. Possible reasons for this include:

- *Fines content in the River Terrace Deposits may be higher than recorded from the*
- *samples, due to the addition of water to aid the drilling process.*

- *A high groundwater table was encountered during the monitoring period that would*
- *be close to the level at the base of the soakaway pit.'*

Based on the above results, it is concluded the use of infiltration devices is not feasible for the site and an alternative discharge method of surface water should be explored.

Ground Investigation Report is shown on **Appendix A**.

Discharge to a watercourse

Based on Environment Agency (EA) Information and satellite/OS mapping, the closest watercourse is the Yeading Brook located approximately 300m east of the site.

Therefore, a connection to an existing watercourse is not considered to be feasible.

Surface Water Runoff Rate & Volume

It is proposed surface water runoff from roof and hardstanding areas of the development will be discharged to the Thames Water surface water sewer at 2.00 l/s for all events up to and including the critical 100 year plus 40% climate change event via a pumping station.

A discharge rate of 2.00 l/s is considered the lowest possible rate whilst also preventing / reducing the possibility of blockage risk of flow controls.

Greenroof are proposed for several areas of the development.

Rainwater harvesting butts are proposed at roof level.

Drainage drawings and calculations are shown on **Appendix B**.

Surface Water Drainage Proposals

It is proposed all external hardstanding areas will utilise permeable paving to ensure treatment and attenuation of run-off. Attenuation is provided within the surface water network for all building roof areas in the form of geocellular below ground tanks.

Exceedance Events

Whilst is it a requirement to fully attenuate the 1 in 100 year critical storm event plus 40% climate change, it is also necessary to ensure storms which exceed this severity do not cause flooding to building areas or exacerbate flooding elsewhere.

It is proposed final hardstanding levels are designed to provide conveyance routes taking storm flows away from building areas and towards areas which are less sensitive to flooding.

Water Quality

The SuDS Manual, 2015 identifies pollution hazard levels of new development based on their proposed land use. In line with the SuDS Manual pollution hazard categorisations, a low pollution risk for the proposed development has been adopted for the external paved areas.

Table 1 shows the total suspended solids, metals and hydrocarbons associated with a low pollution categorization (as provided within the SuDS Manual)

	Total Suspended Solids (TSS)	**Metals**	**Hydro-carbons**
Low pollution hazard index	0.5	0.4	0.4

Table 1: Total suspended solids, and hydrocarbons associated with a low pollution categorization (as provided within the SuDS Manual)

As per the SuDS Manual guidance, conveying runoff through different forms of SuDS provides varied mitigation values. On the basis the combined mitigation index value is higher than the initial mitigation values associated with a low pollution risk, the drainage system is deemed to have sufficiently mitigated the pollution hazard posed:

SuDS Component	**Total Suspended Solids (TSS)**	**Metals**	**Hydro-carbons**
Permeable Paving	0.7	0.6	0.7

Table 2: Mitigation Index for total suspended solids, and hydrocarbons

External hardstanding areas will pass through permeable paving prior to discharging into the stream.

As stated in the SuDS Manual, the pollution hazard associated with residential roofs is very low and removal of gross solids and sediments only is required.

It can be confirmed the proposed drainage strategy treats runoff over and above the guidance provided within the SuDS Manual (C753).

Surface Water Management & Maintenance

For any surface water drainage system to operate as originally designed, it is necessary to ensure that it is adequately maintained to ensure its continued performance throughout its design life.

It is proposed the SuDS features used within this development will be fully maintained and managed by the private landowner.

Table 3, 4 and 5, stipulates the proposed maintenance activities and frequencies the freeholder would carry out over the lifetime of the development for the permeable paving.

Table 3: Operation and Maintenance Requirements for Pervious Pavements

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers.	Annually

Table 4: Operation and Maintenance Requirements for Geo-cellular Tank

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	For system where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or	Annually

	other matter; remove and replace surface infiltration medium as necessary	
	Remove sediment from pre-treatment structures and / or internal forebays	Annually, or as required
Remedial Actions	Repair / rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 5: Operation and Maintenance Requirements for Flow Control Devices

Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Visual inspection and removal of debris / silt. If any siltation or debris is observed, it will be removed by hosing down, manual cleaning (subject to sufficient risk assessment taking place)	Visual inspection to be carried out once every month or after a substantial storm event.
Occasional Maintenance	Remove debris and hose down as a matter of course including clearing of sump chamber	Every 6 months
Remedial Work	Operation of flow control including testing as required. If operation is compromised in any way, flow control to be replaced.	As required

Appendix A – Ground Investigation Report

152-154 Uxbridge Road, Hayes, UB4 0JH

Ground Investigation Interpretative Report

Report No: 2024-065-PRE-UXB_REP001_REV01

Date: 11/03/2025

Geofirma Ltd
Cardinal Point
Park Road
Rickmansworth
WD3 1RE

Tel: 01923 437840
Web: www.geofirmaconsultants.co.uk

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

DOCUMENT CONTROL SHEET

Project	152-154 Uxbridge Road, Hayes, UB4 0JH
Document	Geotechnical and Geoenvironmental Interpretative Report
Project/Report No	2024-065-PRE-UXB_REP001_REV00
Client	Sukanth Yoganathan

Issue/Revision	**First issue**	**Revision 1**	**Revision 2**	**Revision 3**
Remarks		Revised to included findings from internal foundation pitting.		
Date	23/01/2025	11/03/2025		
Prepared by	Kelvin Lee / Kenneth Knox	Kelvin Lee		
Signature				
Checked by	Ebenezer Adenmosun	Kenneth Knox		
Signature				
Authorised by	Ebenezer Adenmosun	Ebenezer Adenmosun		
Signature				

PREAMBLE

The work undertaken to provide the basis of this report comprised a study of the available documented information from a variety of sources, together with (where appropriate) meetings and discussions with relevant authorities and other interested parties. The information reviewed should not be considered exhaustive and has been accepted in good faith by Geofirma as providing a true description of site conditions. However, no liability can be accepted for the detailed accuracy or otherwise of any of the reports or documents prepared by others for the Client or for third parties, or for any associated errors or omissions.

The exploratory holes undertaken during the fieldwork only represents a small volume of the ground in relation to the size of the site and can therefore only provide a general indication of the site conditions.

The comments and recommendations given in this report are based on the ground conditions apparent within the boreholes and trial pits excavated on site. It is likely ground conditions elsewhere on the site have not been disclosed by this investigation and have therefore not been included in this report.

The comments made on groundwater conditions are based on observations made during the time that site works were undertaken. As part of the scope, standpipes were installed for monitoring of ground gas concentrations and groundwater levels. It should be noted that groundwater levels can vary owing to seasonal or other effects.

In relation to asbestos, we are unable to accept the associated liability as indemnity covering asbestos related matters is restricted from our policy. This is typically the industry norm. During the ground investigation, the site supervisor and geotechnical engineer had identified asbestos on the site which is located within the existing on-site 1-2No. storey joint retail and residential building.

The scope of the investigation was decided in consultation with the structural engineer, Precision Structural Engineering, the architect, MS4 Architects Ltd and the Client (Sukanth Yoganathan) and, the limitations of which were made clear. This report is produced solely for the use of the Client and his/her agent and should not be relied upon in any way by any third party.

EXECUTIVE SUMMARY

PROJECT NAME	Uxbridge Road
CLIENT	Sukanth Yoganathan
SITE LOCATION	152-154 Uxbridge Road, Hayes, UB4 0JH
GROUND INVESTIGATION	The intrusive investigation comprised of • 1 cable percussion borehole extending to 20m bgl • 3 window sampler boreholes terminating at the top of the River Terrace Deposits • 4 trial pits excavated for CBR testing at 0.5m bgl. Two of these pits were extended conduct soakaway testing. • 2 foundation inspection pits at the boundary wall and substation building. • Groundwater and ground gas monitoring was undertaken in all the boreholes. • 3 foundation inspection pits undertaken inside the existing building. These pits were excavated at a later date due to the discovery of asbestos during the initial investigation.
GROUND CONDITIONS	Approximately 0.45m thickness of Made Ground was encountered across the site. Langley Silt Member was encountered below the Made Ground at all locations, and is typically described as firm slightly gravelly slightly silty CLAY. River Terrace Deposits were encountered in all boreholes but only proven down to 4.20m bgl depth in BH1. The material is typically a dense sandy GRAVEL. BH1 encountered London Clay between 4.2m and 20m, described as firm to stiff CLAY.
GROUNDWATER	During the investigation groundwater was only encountered within TP4 at 0.45m bgl. A groundwater monitoring visit was conducted on 19/12/2024. Boreholes with response zones

	within the River Terrace Deposits recorded groundwater at approximately 3.1m bgl while variable groundwater levels were recorded in those with response zones within the Made Ground. It is expected that surface water is present perched above the cohesive Langley Silt member, but the groundwater table at 3.1m bgl within the River Terrace Deposits is more indicative of the in-situ groundwater conditions.
CONTAMINATION	No remedial action is required at the site. Following recommendations from the ground investigation. The Asbestos Demolition Survey by Home Counties Asbestos (Appendix I) recommends that the vinyl tile flooring and bitumen adhesive (ACMs) are removed prior to demolition of the existing on-site building. The asbestos removal works was carried out by a licenced asbestos contractor (All Asbestos), which allowed Geofirma Ltd to excavate the indoor foundation pits. Surplus excavated soils on site will need to be removed from the site and disposed of in accordance with current waste management and Duty of Care regulations.
FOUNDATIONS	Shallow pad foundations on the Langley Silt Member are likely not economical as the allowable bearing capacity of 125kPa is insufficient for the estimated column loads. Preliminary safe working loads for pile foundations have been calculated. Based on the estimated column load provided ⌀300mm or ⌀450mm CFA piles are recommended.
BURIED CONCRETE	A Design Sulphate Class of DS-1 and an ACEC classification AC-1s may be adopted the selection of the concrete to be used for pad foundations founded on or above the River Terrace Deposits or bored piles.

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Geofirma has been appointed by Sukanth Yoganathan (henceforth referred to as "the Client") to conduct a ground investigation located at the rear of 152-154 Uxbridge Road, Hayes, UB4 0JH. The site features a joint one and two-storey combined retail and residential building with a dedicated parking area located at the rear of the site. The project proposal involves demolition of existing structures for the subsequent: erection of three-storey mixed use retail and nine residential apartments with ancillary parking, amendments to dropped kerbs, refuse and bicycle storage.

Figure 1. Existing Site and Ground Investigation Location

1.2 OBJECTIVES AND METHODOLOGY

The primary objectives of the ground investigation as stated in the client's scope are as follows:

- Establish ground and groundwater conditions beneath the site;
- Determine the strata on which the existing building foundations are found on;
- Derive geotechnical parameters to inform the bearing capacity for the proposed foundations;
- Provide engineering recommendations for the foundation design based on the current proposal, including an assessment of the existing bearing capacity at the site and

potential deep/pile foundations. Additionally, evaluate the feasibility of implementing a ground-bearing slab foundation for the proposed development;

- Determine the sulphate classification for buried concrete structures at the site;
- Provide a recommended CBR value for the design of car parking and pavements at the site, based on the results obtained from the ground investigation;
- Determine the infiltration rate of the soil for surface water and soakaway design;
- Present geotechnical advice on any exceptional or difficult ground related issues on the site that may have influence on the proposed scheme.

1.3 PREVIOUS REPORTS

Before commencing the ground investigation, a Phase 1 Contaminated Land Assessment was provided to Geofirma by the Client. This assessment, prepared by Reports4Planning, was issued to the Client on 13th December 2021. It will be frequently referenced and can be found in Appendix H.

As part of the assessment, a site walkover was conducted. No significant changes to the site were observed during Geofirma Ltd's pre-ground investigation site walkover on 28th November 2024.

2 SITE DETAILS

2.1 SITE LOCATION AND DESCRIPTION

The site summary is in Table 1 below:

Table 1. Site Summary

Location	The existing site is approximately 0.17 acres in plan and is shown (outlined in red) in Figure 2. The approximate British National Grid coordinates for the main building is Easting 511419 Northing 180817.
Full Address	152-154 Uxbridge Road, Hayes, London, UB4 0JH
Development Proposals	The proposed redevelopment involves the construction of a three-story mixed-use building comprising retail space and nine residential apartments, along with ancillary parking, modifications to dropped kerbs, and provisions for refuse and bicycle storage. The development will feature two structures positioned to the north and south, with a car parking area situated between them.

Figure 2: Site Location

2.2 GEOLOGY

According to the published geology, based on the British Geological Survey (BGS) map 1:50,000 geological map series, the site is underlain by the Langley Silt Member superficial deposits, as seen in Figure 3. The BGS describes the Langley Silt Member as silt to clay,

commonly yellow-brown and massively bedded. There are localised areas of Lynch Hill Gravel Members shown to the south of the site, but well outside the site boundary. The bedrock geology is from the London Clay Formation, as shown in Figure 4. The BGS describes the London Clay Formation bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

The published geology at the site is summarised below in Table 2.

Figure 3: BGS Superficial Geology Map at Site Location

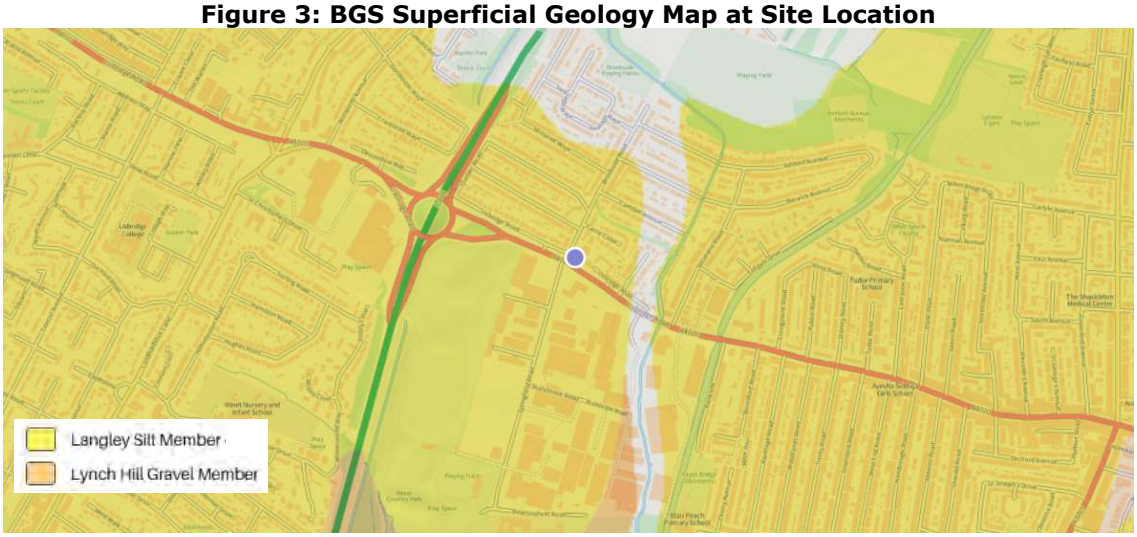


Figure 4: BGS Bedrock Geology Map at Site Location

Table 2. Summary of Published Geology

Geological Unit	Strata Name	Composition	BGS Lexicon Description
Superficial	Langley Silt Member	Silt and Clay	Varies from silt to clay, commonly yellow-brown and massively bedded. The lower boundary rests on sand and gravel River Terrace Deposits, with sharp base.
Bedrock	London Clay Formation	Silty Clay	Mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occurs in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

2.3 BGS-NEARBY HISTORICAL BOREHOLE LOGS

The nearest historical borehole log (100 m south) with BGS Reference: TQ18SW7, confirmed that based on the above descriptions the ground likely commences in the Langley Silt Member (characterised by brown, sand, clay properties) which is likely underlain by the River Terrace Deposits which, is subsequently underlain by the London Clay Formation. The historical borehole log can be viewed in Appendix G.

2.4 GROUND INVESTIGATION

The investigation was carried out between 10th to 13th December 2024 and 20th February by Geofirma and comprised the following:

- The drilling of 4 No. boreholes:
    - BH1 was drilled to 20 m bgl under the proposed footprint of the proposed building using a cable-percussion rig. Standard Penetration Tests (SPT's) were undertaken at 1.0 m intervals to top of London Clay; SPTs were undertaken at 1.5 m intervals from the top of the London Clay Formation to base of borehole (20 m bgl).
    - WS1-WS3 was drilled to a maximum depth of 3.7 m bgl using a window sampling rig which refused within and at the top of the River Terrace Deposits.
- The excavation of 6 No. trial pits (SA1, SA2, TP3 and TP4) within the existing car parking area and 3 No. trial pits (TP1, TP5 and TP6) inside the existing building following asbestos removal:

- Trial pits SA1 and SA2 was undertaken for the BRE365 soakaway testing. The pits were logged prior to soakaway testing.

- Trial pits TP1, TP3, TP4 and TP5 were undertaken to expose the underside of the third-party wall foundations so that the profile of the wall and foundation can be logged. Foundation inspection pit sketches can be found in Appendix B.

- Trial pit TP2 was cancelled as the proposed location was covered 250 mm reinforced concrete slab and it would have taken too long to uncover the foundation (at TP2) without a concrete coring rig.

- Trial Pit TP6 was excavated as an additional investigation to assess variations in the materials supporting the existing concrete slab. The findings are presented in the exploratory hole location plan in Appendix A; a sketch of the pit is provided in Appendix B.

- The breaking out of an additional 4 No. shallow trial pits (CBR1 to CBR4) for Californian Bearing Ratio testing. Samples at the base of these pits were taken off-site for Moisture Content testing at a geotechnical laboratory.

- After CBR1 and CBR2 were tested for Californian Bearing Ratio tests, the pits were subsequently widened and deepened for subsequent infiltration testing, referenced as SA1 and SA2.

The fieldwork was supervised on a full-time basis by a Geotechnical Engineer from Geofirma. The exploratory hole record with soil descriptions is included in Appendix B prepared by Geofirma. The location of the borehole and trial pits is shown on the Exploratory Hole Location Plans in Appendix A. Selected samples were taken off-site for advanced geotechnical laboratory testing. Results of the tests are shown in Appendix C.

3 GROUND CONDITIONS

3.1 INTRODUCTION

The composition of Made Ground roughly varied from north to south of site, however the profile of the natural strata encountered was consistent. Table 3 summarises the descriptions of the different strata encountered during the ground investigation.

Table 3. Proven ground Conditions

Strata	Summary of Descriptions
Tarmac	Road surfacing/ tarmacadum.
Concrete	Road surfacing.
Topsoil	Vegetation over loose dark brown slightly clayey sandy GRAVEL. Sand is angular coarse. Gravel is rounded to angular fine to medium to brick fragments, tarmacadum and flint. Rare presence of ash.
	Vegetation over very dark brown clayey silty SAND. Sand is angular fine. Frequent rootlets. Rare presence of ash.
Made Ground	Loose dark brown slightly gravelly slightly clayey SAND. Gravel is angular medium to coarse of flint and brick fragments. Sand is angular coarse.
	Multicoloured sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular medium of shingle, tarmacadum and brick fragments.
Langley Silt Member	Firm light brown slightly gravelly slightly silty CLAY.
	Firm to stiff light grey stained dark brown mottled light brown CLAY, Occasional lenses of sand and gravel. Sand is angular coarse. Gravel is angular fine to medium of flint.
River Terrace Deposits	Medium dense to very dense slightly clayey slightly sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint.
London Clay Formation	Firm to very stuff light grey silty CLAY with rare to occasional presence of selenite crystals. Laminated bedding noted near base of borehole (19.85 m bgl).

3.2 MADE GROUND

3.2.1 Description

The composition of Made Ground material varies across the site; the Made Ground varied underneath the different road surfaces and topsoil:

- Beneath the tarmac area - comprised of debris of brick fragment, various sized sands and flints/imported shingle and tarmac fragments. Composition is slightly clay.
- Beneath the concrete area – primarily comprised of imported sand and gravel of various sizes with occasional presence of brick and tarmac. Becomes clayey with increasing depth.
- Beneath the landscaped area – comprised of CLAY with imported sand and gravel of various sizes with occasional tarmac fragments.

Based on the material description a friction angle of 28° and a unit weight of 17 kN/m^3 is appropriate for this material.

3.3 LANGLEY SILT MEMBER

3.3.1 Description

The Langley Silt Member was encountered at roughly 0.45 m bgl and was described as a firm silty CLAY with stiffness increasing with depth. The thickness of the Langley Silt Member ranged from 1.0 m to 1.8 m, with the thickest section located at the centre of the car parking area. The stratum was occasionally dark brown mottled, occasionally light grey stained light brown CLAY. This material was encountered in all exploratory holes.

Based on the material description a unit weight of 18 kN/m^3 is deemed appropriate for this stratum.

3.3.2 Moisture Content

A total of 2No. natural moisture content tests were conducted on selected samples from depths of 1.2 m to 1.8 m bgl. 4 No. additional moisture content tests were conducted on samples taken from the base of the CBR test locations, for which the results are summarised in Table 4. The results indicate an average moisture content of 21% for the Langley Silt Member.

Table 4. Natural Moisture Content of Langley Silt samples

Location	Depth (m)	Description	Moisture Content (% by mass)
WS2	1.4	High strength brown slightly sandy silty CLAY	24
WS3	1.2	Brown slightly sandy slightly gravelly silty CLAY (gravel is fine to medium and sub-angular to sub-rounded)	17
CBR1	0.5	Brown slightly sandy silty CLAY	24
CBR2	0.5	Brown slightly sandy silty CLAY	23
CBR3	0.5	Brown slightly sandy silty CLAY	21
CBR4	0.5	Brown slightly sandy slightly gravelly silty CLAY (gravel is fine to medium and sub-rounded)	18

3.3.3 Atterberg Limit

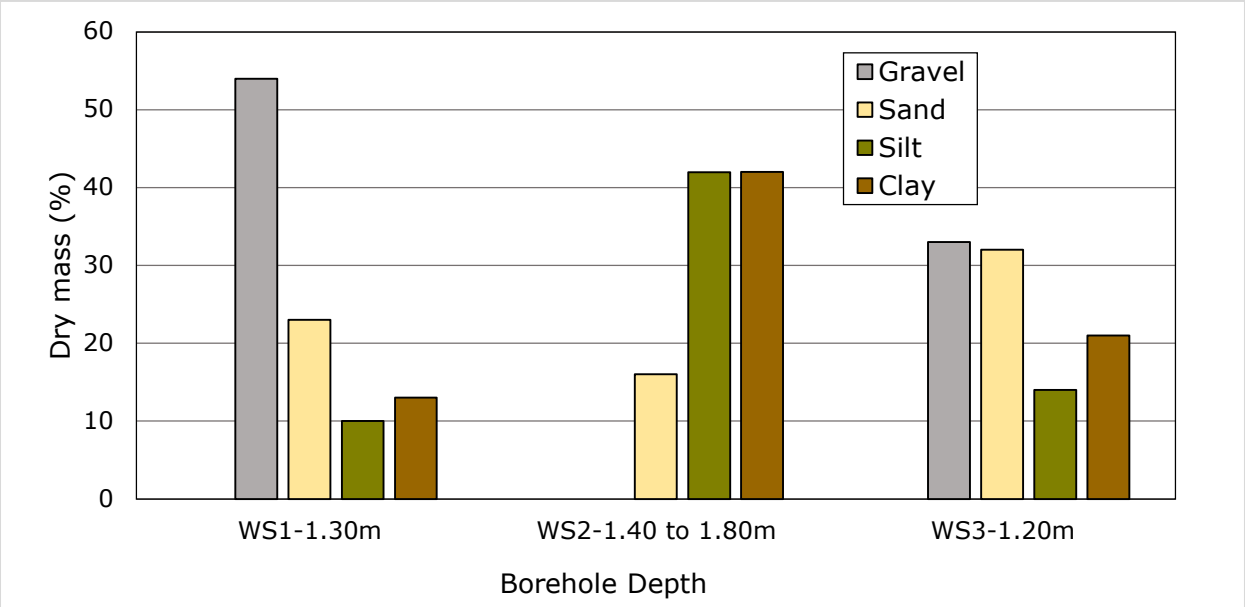
2No. Atterberg limit tests were conducted on samples of Langley Silt member from WS2 and WS3 at depths between 1.2 m and 1.8 m bgl respectively. The tests recorded a liquid limit ranging from 49% to 50%, a plastic limit between 18% and 20%, and a plasticity index from 30% to 31%. Given that the percentage of particles passing the 425 µm sieve was not 100%, a modified plasticity index (I'p) is calculated.

The percentage passing 425 µm for the tested samples are between 57% and 98%, for which the maximum modified plasticity index was 30%. Based on Table 1 in Section 4.2.4 of the NHBC Guidelines the soil has a medium volume change potential and therefore is likely to exhibit compressibility and shrink-swell behaviour.

3.3.4 Particle Size Distribution

3 No. single Particle Size Distribution (PSD) tests were conducted on samples from the Langley Silt Member, obtained at depths between 1.2 and 1.8 m bgl during the Geofirma investigation. The results, illustrated in Figure 5, show that the samples of this stratum contains between 23 and 84% fine particles (<0.063 mm).

Figure 5: Particle size distribution of the Langley Silt Member



The sample from WS2 is the most indicative of the general composition of this stratum. It is expected that the high proportion of sand and gravel in the sample from WS1 is due to the sample being within a transition layer with the River Terrace Deposits, and the sample from WS3 appears to include a lens of sand and gravel at the sampled location.

3.3.5 Strength Characteristics

Standard Penetration Testing (SPT) was carried out and the uncorrected SPT 'N' Values were recorded on the exploratory hole records. The data shows results ranging from 14 to 28 blows. Shear strengths were derived from the SPT 'N' using the empirical formula $c_u = 5N$ (Stroud and Butler and CIRIA R143). One undrained triaxial test was also conducted. Summary of the results are included in Table 5:

Table 5: Undrained shear strength results for Langley Silt Member

Hole Reference	Depth (m)	SPT N Value	c_u (kPa)
WS1	1.00	28	140
WS2	1.00	17	85

Hole Reference	Depth (m)	SPT N Value	c_u (kPa)
WS3	2.00	14	70
WS3	1.00	27	135
WS2 (Triaxial)	1.60	-	90

Based on the SPT testing, triaxial test, the material description and moisture content, an undrained shear strength of 60 kPa is recommended for the Langley Silt Member.

Atterberg tests results have been used to determine the index properties of the soil and hence establish the effective stress angle of friction using guidelines from BS 8002:2015. The critical state angle of friction derived is 24°. The worst case characteristic critical state effective cohesion c' is assumed to be zero.

3.3.6 Young's Modulus

The value of undrained Young's Modulus, E_u, for the Langley Silt Member can be determined by using SPT 'N' values and relationships recommended by CIRIA 760 and Burland, Standing, and Jardine (2001). The stiffness modulus is calculated using the formula $E_u = 500c_u$. Therefore, an E_u value of 30 MPa may be adopted for settlement calculations (SLS).

Assuming a Poisson's ratio (ν) of 0.35, an E' (drained young modulus) of $0.75*E_u$ should be adopted. Therefore, an E' = 23 MPa may be adopted for the computation of settlements (SLS).

3.4 RIVER TERRACE DEPOSITS

3.4.1 Description

The River Terrace Deposits was encountered at roughly 0.9 m to 1.7 m bgl within all boreholes. The thickness of the strata was verified only once (at BH1) with a thickness of 3.3 m. The stratum was described as dense to very dense with decreasing density when approaching the underlying London Clay Formation.

The only discrepancy was that the material in WS2 was described as loose to medium dense, likely due to the loosening of granular deposits caused by an artificially elevated water table or overnight water seepage. This observation aligns with the borehole, where overnight water seeped into the inspection pit (at a depth of 1.2 m bgl) which caused the water level to rise to 0.3 m bgl. A unit weight of 19 kN/m³ will be considered suitable for design purposes for this stratum.

3.4.2 Moisture Content

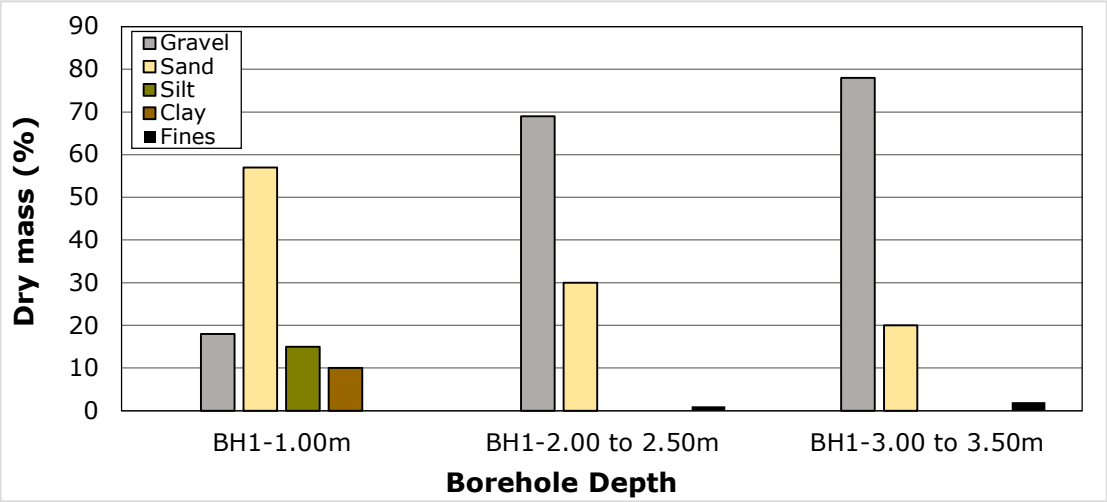
2 No. natural moisture content test was conducted from samples taken from the River Terrace Deposits from 1.30m bgl at WS1 and 1.00m bgl at BH1, giving moisture content values of 10% and 15% respectively.

3.4.3 Particle Size Distribution

3No. Particle Size Distribution (PSD) tests were carried out on materials from the River Terrace Deposits. Samples were taken from depths between 1.0 m to 3.5 m bgl. The results, depicted graphically in Figure 6, indicate that this stratum is predominantly granular, comprising between 75% and 99% of granular material, with fine particles (<0.063mm) present in smaller proportions (total of 1% to 25%). Consequently, the soil is predominantly a sandy GRAVEL.

It is noted that to progress through the dense River Terrace Deposits water was added to the borehole, which may have washed out some of the fines from the River Terrace Deposits, leading to a lower fines content in the sampled material than may be present in the in-situ material.

Figure 6: Particle size distribution overview of River Terrace Deposits samples



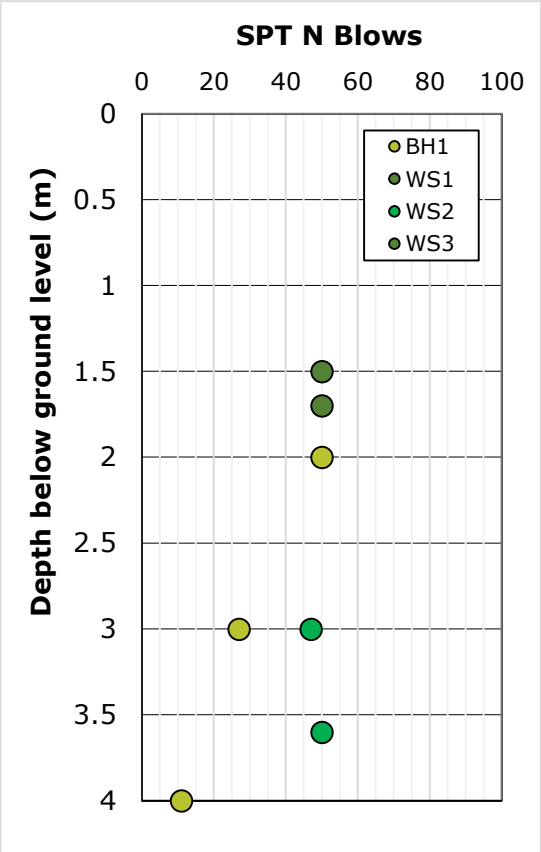
3.4.4 Strength Characteristics

The River Terrace Deposits Formation found on site is predominantly granular, hence the characteristic critical state effective angles of friction ϕ'_{cv} can be determined using Equation 3 of BS 8002:2015. This equation is based on the uniformity coefficient obtained from the grading analysis, along with the description of the angularity of the samples. The equation is given as:

$$\phi'_{cv} = 30° + \phi'_{PSD} + \phi'_{ang}$$

where ϕ'_{PSD} is the contribution from the soil's particle size distribution and ϕ'_{ang} is from the angularity of the soil particles. Based on the guidelines from BS 8002:2015, the River Terrace Deposits Formation granular deposits exhibit a characteristic friction angle of 36°.

Figure 7: SPT N Results vs Depth Plot for River Terrace Deposits



3.4.5 Young's Modulus

Standard Penetration Testing (SPT) was conducted, with uncorrected SPT 'N' values recorded in the exploratory hole logs and shown in Figure 7. Measured SPT N-values in the River Terrace Deposits typically exceeded 50, reducing towards the base of the stratum. Using the correlation E'=2N (MPa), the drained Young's Modulus (E') was estimated as 60 MPa, taking into account the reduced stiffness at the bottom of the layer.

3.5 LONDON CLAY FORMATION

3.5.1 Description

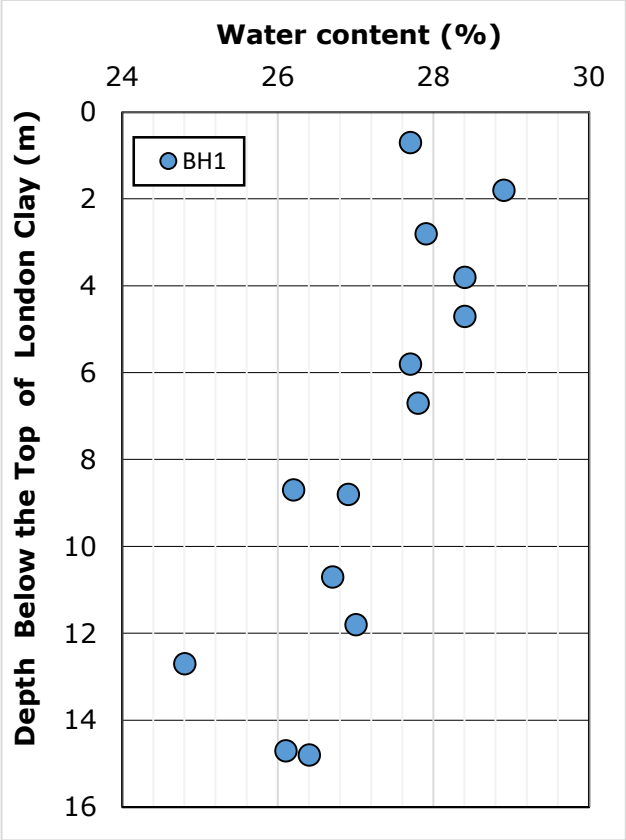
The London Clay Formation was only reached once at 4.2 m bgl within BH1 and the thickness of this stratum was not verified; the borehole terminated at 20 m bgl after reaching the required depth for potential pile foundation design. The material was described as firm to stiff becoming very stiff with increasing depth, light grey silty CLAY. Rare to occasional presence of selenite crystals (with increasing depth) was noted within the clay matrix.

Based on the material description a unit weight of 19 kN/m^3 is deemed appropriate for this stratum.

3.5.2 Moisture Content

A total of 14No. natural moisture content tests were conducted on selected samples from depths of 4.9 m to 26.4 m bgl. The results indicate that the moisture content of the London Clay Formation across these depths is between 25 to 29%. The distribution of water content with depth is illustrated in Figure 8.

Figure 8. Moisture content against depth plot for London Clay



3.5.3 Atterberg Limit

2No. Atterberg limit tests were conducted on samples taken from depths of 10 m and 14.9 m bgl from BH1. The tests recorded a liquid limit ranging from 71% to 77%, a plastic limit between 28% and 30%, and a plasticity index from 43% to 47%. Given that the percentage of particles passing the 425 µm sieve was 100% for both samples, the modified plasticity index (I'p) is the same as the plasticity index in this case.

Based on Table 1 in Section 4.2.4 of the NHBC Guidelines the soil has a high-volume change potential, therefore may be at risk of shrink-swell behaviour due to changes in moisture content.

3.5.4 Particle Size Distribution

No particle size distribution tests were carried out on the London Clay, however it is noted that both samples from the Atterberg Limit tests were comprised of 100% fines particles.

3.5.5 Strength Characteristics

Standard Penetration Testing (SPT) was carried out and the uncorrected SPT 'N' Values were recorded on the exploratory hole records. The data shows results ranging from 16 to 50 blows and a general trend of increasing N-value with depth. Shear strengths were derived from the SPT 'N' using the empirical formula $c_u = 5N$ (Stroud and Butler and CIRIA R143). The results from the triaxial testing and undrained shear strengths derived from the SPTs are plotted in Figure 9. Based on the SPT and triaxial results, the material description and moisture content, the following undrained shear strength vs depth relationship has been adopted:

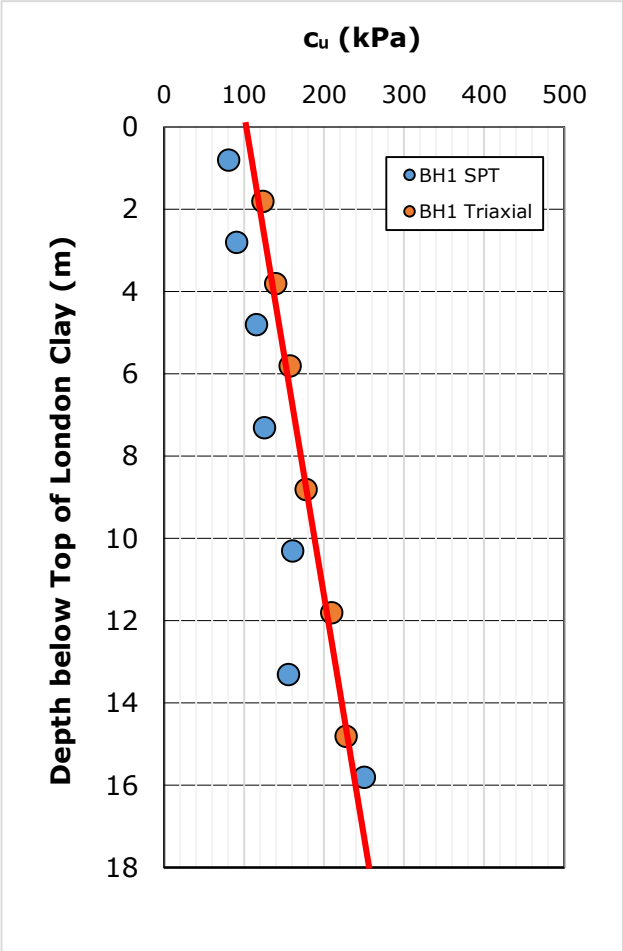
$$c_u\ (kPa) = 8.5z + 100$$

Where z is the depth below the top of the London Clay.

Note that the triaxial testing has been more heavily weighted when deriving the design line for the London Clay, since there is only an indirect correlation between SPT N values and the undrained shear strength that is heavily dependent on the factor f_1 chosen.

The effective angle of friction for London Clay is taken as 24°, based on prior experience working in London Clay. The worst case characteristic critical state effective cohesion c' is assumed to be zero.

Figure 9: Undrained Shear Strength vs Depth of London Clay



3.5.6 Young's Modulus

The value of undrained Young's Modulus, E_u, for the Langley Silt Member can be determined by using SPT 'N' values and relationships recommended by CIRIA 760 and Burland, Standing, and Jardine (2001). The stiffness modulus is calculated using the formula $E_u = 500c_u$. Therefore, an E_u value of 4.2z + 50 MPa may be adopted for settlement calculations (SLS).

Assuming a Poisson's ratio (ν) of 0.35, an E' (drained young modulus) of 0.75*E_u should be adopted. Therefore, an E' = 3.2z + 38 MPa may be adopted for the computation of settlements (SLS).

3.6 SUMMARY OF GEOTECHNICAL PARAMETERS

Based on the ground investigation and laboratory testing, the following design parameters have been derived and presented in Table 6. These may be relied upon in the design of geotechnical structures.

Table 6: Summary of Geotechnical Parameters

Stratum	Depth to base (m)	γ (kN/m³)	c_u (kPa)	ϕ' (°)	E_u (MPa)	E' (MPa)	v
Made Ground	0.45	17	-	28	-	25	0.4
Langley Silt Member	1.8	19	60	24	30	23	0.35
River Terrace Deposits	4.2	19	-	36	-	60	0.25
London Clay	Unknown	19	8.5z + 100	24	4.2z + 50	3.2z + 38	0.35

Z is taken from the top of the London Clay

3.7 GENERAL GROUNDWATER REGIME

Groundwater was not encountered in any of the exploratory holes however, water was recorded at 0.3 m bgl in WS2 where overnight rainfall had entered the inspection pit.

One groundwater monitoring visit was undertaken on 19/12/2024. The water levels recorded are summarised in the table below:

Table 7: Groundwater Monitoring Results

Location	Response Zone (m bgl)	Water Level (m bgl)
BH1	2.00 to 4.00	3.18
WS1	0.25 to 1.50	0.62
WS2	0.70 to 3.00	3.12
WS3	0.25 to 1.25	1.26

The monitoring results suggest that groundwater within the River Terrace Deposits is present at approximately 3.1m bgl. A higher groundwater table was encountered for the monitoring points with response zone in the Made Ground layer. It is expected that water in the Made Ground is generally perched on the cohesive Langley Silt member, and therefore a groundwater table at 3.10m bgl is more representative of the site conditions.

3.8 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

As part of the initial site inspection carried out by Reports4Planning on 17th November 2021 to support the Phase 1 Land Contamination Assessment for the site, an electrical sub-station (dating to the early-1970s) was identified as a potential source of contamination at the site. The electricity substation was located immediately adjacent to the north-eastern corner of the site and was housed in a red, fully enclosed brick-built structure, accessed via the track to the rear of the site. At the time of the ground investigation, no obvious evidence of significant contamination associated with the sub-station was noted.

It was proposed that two trial pits (TP1 & TP2) were to be undertaken inside the existing joint residential/commercial dwelling to profile the existing building foundations however, asbestos was identified within the existing vinyl-tile flooring and the screed that adhered the tiles to the floor. Sample photos of the ACMs can be viewed in Appendix I.

No evidence of spills, leaks, staining or other potential sources of contamination were noted during the ground investigation on site.

As detailed in Section 3.2 of this report, the Made Ground on site was 0.45 m to 1 m thick and was present at ground level in all exploratory holes on site. The upper surface of the Made Ground comprised tarmacadam (BH1, WS1, WS2 and SA2), concrete (WS3) and re-worked topsoil (SA1, TP3 and TP4). The rare presence of ash was recorded in SA1 between ground level and 0.3 m bgl and the foundation inspection pits, TP3 and TP4 between ground level and 0.2 m to 0.25 m bgl. No other evidence of contamination was found during the ground investigation.

4 ENGINEERING CONSIDERATIONS

4.1 FOUNDATION DESIGN

4.1.1 Introduction

The current proposal is to redevelop the site by constructing a new three-storey building. The footprint of the new building will be larger than that of the existing one and is expected to extend into the current parking area. The ground investigation was required to determine the properties and depths of the existing ground conditions to inform the foundation design.

4.1.2 Bearing Capacity Assessment for Pad Foundations

Based on the data obtained during the ground investigation, shallow foundations may be founded on the Langley Silt Member or River Terrace Deposits. The allowable bearing capacity has therefore been calculated for both materials and the lower value used. For the Langley Silt Member the allowable bearing capacity is calculated by:

$$q_{all} = \frac{N_c \, s_c \, c_u}{FOS} + q$$

c_u Undrained shear strength

FOS Factor of safety (3)

q Overburden pressure above base of foundation

N_c Bearing capacity factor

s_c Shape factor

For the River Terrace Deposits the allowable bearing capacity is calculated by:

$$q_{all} = \frac{0.5 \, \gamma \, B \, N_\gamma s_\gamma + q \, N_q \, s_q}{FOS}$$

γ Unit weight of subgrade

B Breadth of foundation

FOS Factor of safety (2)

q Overburden pressure above base of foundation

N_γ, N_q Bearing capacity factors

s_γ, s_q Shape factors

The allowable bearing capacity in the Langley Silt Member soils are critical, due to the lower shear strength at the depth considered. An allowable bearing capacity of 125kPa may be adopted site wide for foundation designs. Note the bearing capacity is reduced by lateral and eccentric loads, and therefore any foundations that will be subject to lateral or eccentric loads will require detailed design.

A preliminary estimate of the maximum column loads have been given by the client as 500kN, which would therefore require a 2.0 × 2.0m pad to satisfy the allowable bearing capacity on the Langley Silt, which is expected not to be economical. Additionally, based on the stiffness

parameters of the soil, the total settlement of the foundation is likely to range between 10 to 15 mm for a 500kN column load.

4.1.3 Safe Working Loads for Piled Foundations

The use of piles to support the frame of the proposed new building has been considered as an alternative to the use of shallow foundations.

Given the size of the site, it is considered appropriate to use minipiles, therefore pile capacities have been assessed for pile diameters between 225mm and 450mm (Table 8). For the 500kN column load given, it will not be possible to support this load on single piles and pile diameters between 300mm and 450mm are recommended.

The settlement of each pile is not expected to exceed 5 mm under loading. Therefore, if the differential settlement of the frame is deemed critical, piling will be the preferred foundation solution for this scheme.

Table 8. Estimated Pile Safe Working Loads (SWL) for different pile diameters.

Pile Length (m)	Allowable capacity SWL		
	Ø = 225 mm	Ø = 300 mm	Ø = 450 mm
	[kN]	[kN]	[kN]
6	70	100	172
6.5	78	112	190
7	87	124	209
7.5	96	136	228
8	106	149	248
8.5	116	163	269
9	126	176	290
9.5	136	190	312
10	147	205	334
10.5	158	219	357
11	169	235	381
11.5	180	250	405

It is important to note that using piles will generate a larger proportion of spoil than the shallow foundation options. The spoil will have to be disposed offsite and appropriate contamination testing will be required to correctly classify for offsite disposal, hence will incur cost. CFA piling is likely to be the preferred piling technique due to the presence of groundwater in the River Terrace Deposits as it reduces the risk of bore instability.

4.1.4 Existing Foundations

Trial pits TP3 and TP4 were undertaken to expose the underside of the third-party wall foundations so that the profile of the wall and foundation can be logged. Trial pits TP1 and

TP5 were undertaken at a later date (due to the presence of asbestos discovered in the initial investigation), to expose the underside of the third-party wall foundations from within the existing building. Foundation inspection pit sketches can be found in Appendix B.

In TP1 the base of the column foundation was encountered at 1.1 m bgl. The column is founded on a pad foundation that protrudes 0.25 m outside the face of the columns. The ground below the foundation was confirmed to be Langley Silt Member, described as soft to firm light brown sandy gravelly CLAY. Based on the depth of the column foundations, it is assumed that the party-wall foundations (that support the two-storey building) are no deeper than 1.1 m bgl.

In TP3 the base of the wall foundation was encountered at 0.35 m bgl. The wall is founded on a 0.2 m strip foundation that protrudes 0.15m beyond the face of the wall. The ground below the foundation was confirmed to be Langley Silt Member, described as Firm sandy gravelly CLAY.

In TP4 at the wall of the substation building the masonry brick wall was exposed down to 0.95m bgl where it is founded on the Langley Silt Member, described as firm silty slightly sandy slightly gravelly CLAY. No foundation was encountered below the external wall.

In TP5, the base of the party wall foundation (that support the one-storey building) was encountered at 0.35 m bgl; the party wall is founded on a 350 m strip foundation. The ground below the foundation was confirmed to be Langley Silt Member, described as soft light brown sandy gravelly CLAY.

Based on the shallow foundation found at TP5, we can assume that the party wall foundation at TP2 is similar to that of TP5. This is because the party-wall at TP2 supports only a single-storey structure, whereas the party-wall at TP5 supports a two-storey structure.

4.2 FLOOR SLAB

Ground-bearing floor slabs may be appropriate for this site. The Langley Silt Member soils demonstrate sufficient load-bearing capacity but has a modified plasticity index that indicates medium volume change potential. However, the lack of nearby trees may mean that soil moisture variation over the building's lifespan will likely not be sufficient to cause significant shrinkage. It is recommended that the slab construction follows NHBC guidelines 4.2 for best practices. Alternatively, a reinforced cast-in-situ suspended floor could also be a feasible option.

4.3 EXCAVATIONS

As the site is relatively level, with no basement structures proposed to date, the depth of any proposed excavations is expected to be relatively shallow.

Short term stability is expected to be favourable in the original ground given the high undrained shear strength of the Langley Silty Member. Short term stability of the granular River Terrace deposits will be significantly reduced if exposed to water, therefore it is recommended that drainage measures are used to keep any excavations extending through the River Terrace Deposits dry. Groundwater was encountered at 3.1m bgl during the monitoring period, therefore exposure to water during excavations should be considered highly likely.

Excavations in the Langley Silt Member should be battered back at 1V:1H in the upper Made Ground layer and 2V:1H in original ground. However any excavations within the River Terrace Deposits should be battered at 1V:1H over the full height.

4.4 CONCRETE SULPHATE RESISTANCE

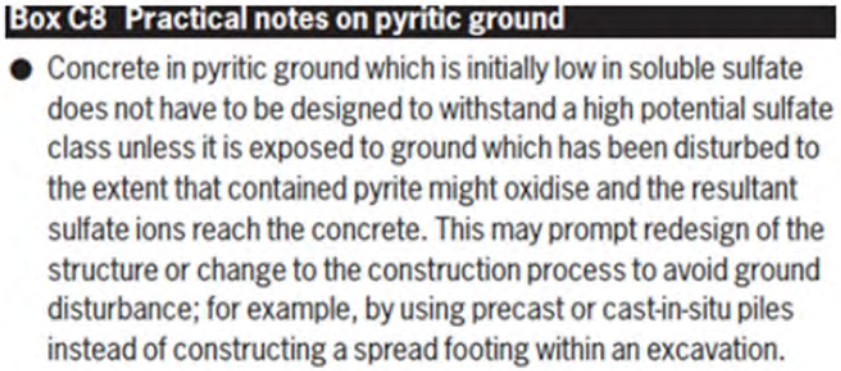
4No. Soil samples were recovered for sulphate classification related chemical testing from BH1 at depth: 2.9 m, 5.9 m, 9.0 m and 14.5 m bgl.

Based on the guidance in BRE Guidance Special Digest 1:2005, a design sulphate class and an Aggressive Chemical Environment for Concrete (ACEC) classification can be determined for the concrete to be used for buried structures.

The water-soluble sulphate values vary between 32.9 mg/l (DS-1) and 447 mg/l (DS-1) and the total potential sulphate between 0.28 % (DS-2) and 1.1 % (DS-3). pH values range between 8.6 and 9.8. Assuming static groundwater and brownfield location, a Design Sulphate Class of DS-3 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2s would need to be used for the design of the concrete foundations at the site.

However, as stated in Section 4.1.2, shallow foundations would only be viable if located within the Gravels, in which the risk of oxidation due to pyritic content is minimal. Therefore, a DS-1 Design Sulphate Class and an ACEC classification AC-1s may be adopted for shallow foundations.

Figure 10. Excerpt from BRE Special Digest 1:2005



Box C8 Practical notes on pyritic ground

- Concrete in pyritic ground which is initially low in soluble sulfate does not have to be designed to withstand a high potential sulfate class unless it is exposed to ground which has been disturbed to the extent that contained pyrite might oxidise and the resultant sulfate ions reach the concrete. This may prompt redesign of the structure or change to the construction process to avoid ground disturbance; for example, by using precast or cast-in-situ piles instead of constructing a spread footing within an excavation.

As explained in Figure 10, although the quantity of pyrites might be important, the bored/SFA/CFA technique used to form the piles is unlikely to disturb and hence oxidise the pyrites to convert to sulphate ions. Hence the pile concrete can be solely classified on the basis of the soluble sulphate content as determined from the water-soluble sulphate tests. Thus, a Design Sulphate Class of DS-1 and an ACEC classification AC-1s may be adopted the selection of the concrete to be used for the pile foundation.

4.5 SUDS DESIGN

Infiltration testing was carried out to determine infiltration rates for the design of SuDS elements.

4.5.1 Infiltration Rate

Infiltration testing was carried out to inform the design of soakaways at the site as part of the future development, however the change in water level over the course of the test was insufficient to allow the water to drain to half empty within 24 hours, and therefore the site is not recommended for use with soakaways.

Table 9. Infiltration rate derived from soakaway tests

Hole ID	Stratum	Depth (m)	Infiltration Rate ($m^3/m^2/s$)
SA1	Langley Silt Member	1.30	N/A
SA2	River Terrace Deposits	2.80	N/A

In both soakaway tests (testing duration ~5 hours) and, when 1 metre of the testing stratum was submerged in water, there was a:

- 20 mm drop in water level within SA1 and;
- Zero drop in water level within SA2.
    - It was noted that during the filling of SA2, the water was 'free-draining' until water level started to rise so that the soakaway test could commence.

It is noted that there was light rainfall during the day of testing, however this is expected to have very little influence on the infiltration test.

It is noted that River Terrace Deposits would typically be favourable for infiltration, however this was not observed during the infiltration testing. Possible reasons for this include:

1. Fines content in the River Terrace Deposits may be higher than recorded from the samples, due to the addition of water to aid the drilling process.
2. A high groundwater table was encountered during the monitoring period that would be close to the level at the base of the soakaway pit.

A planning portal search was conducted to see if nearby any nearby sites had successfully adopted infiltration-based drainage measures. The only example found that included a Drainage Strategy document was at Bullsbrook Road Substation, which had excluded infiltration as a drainage strategy due to both low infiltration rates and risk of contaminating groundwater. Additionally, the Surface Water Report by Reports4Planning for the site notes that the site geology is not expected to be suitable for infiltration.

Ultimately, as the River Terrace Deposits exhibited free draining behaviour initially and is typically expected to be suitable for soakaways, it is recommended that further soakaway testing is undertaken to confirm the results of SA2.

4.6 PAVEMENT DESIGN

In-situ CBR testing was carried out at four locations, giving a minimum CBR value of 2.2% at location CBR2. A subgrade CBR value of 2% is recommended for the design of pavements at the site. A summary of the results obtained is given in the table below:

Table 10: Summary of CBR Results

Location	Moisture Content (%)	CBR Value (%)
CBR1	24	6.4
CBR2	23	2.2
CBR3	21	3.5
CBR4	18	3.0

Note that while testing has only been carried out on the subgrade, the existing subbase material encountered at the test locations may be suitable for reuse.

5 CONTAMINATION DATA REVIEW

5.1 PRELIMINARY RISK ASSESSMENT

A detailed Phase 1 Land Contamination Assessment, also known as a Desk Study, was undertaken in December 2021 by Reports4Planning (report reference: 21CLR5516NH) for the site. The Desk Study should be read in conjunction with this report.

No significant contamination sources were identified on site as part of the assessment carried out, though a layer of Made Ground, of unknown thickness and composition was considered likely to be present across the site area. The potential for Asbestos and Asbestos-Containing Materials (ACMs) to be present within the existing structures on site was also identified. Nearby off-site contaminant sources identified locally included an adjacent electrical sub-station, a former motor vehicle garage approximately 40 m south (which was investigated in 2012 and not found to be significantly contaminated), a historic inert landfill approximately 120 m west and the former Brookside brickworks from approximately 180 m east. The site was considered to pose a very low to low risk, assuming the proposed redevelopment of the site for residential use.

5.2 CONTAMINATION SAMPLING AND TESTING

During the ground investigation undertaken by Geofirma Ltd in December 2024, 3 No. soil samples were taken from BH1 (at 1.3 m bgl within the Langley Silt Member), WS2 (at 0.6 m bgl within the Langley Silt Member) and SA2 (at 0.3 m bgl within the Made Ground) for contamination testing. The rationale for the selection of sampling locations is that they provide general coverage of the site, focussing on the proposed residential accommodation at the north of the site, while also considering access limitations at the site to facilitate an assessment of contamination on site. BH1 and SA2 were located at the north of the site and WS1 was located within the centre of the site as shown in Figure 11.

Figure 11: Exploratory Hole Location Plan

The three soil samples were tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA). These included heavy metals, semi-metals and metalloids (including Cyanide, Lead and Arsenic), speciated Poly-cyclic Aromatic Hydrocarbons (PAHs), speciated aromatic and aliphatic Total Petroleum Hydrocarbons (TPH C10-C40) and BTEX and MTBE in accordance with Environment Agency guidelines. All 3 No. soil samples were also assessed for the presence of Asbestos. Full copies of the soil chemical analysis certificates are included as Appendix D.

The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for most of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

5.3 HUMAN HEALTH RISK ASSESSMENT

An initial Tier 1 (generic) quantitative risk assessment has been undertaken by screening measured contaminant concentrations derived from the ground investigation works against reference values for chronic (long-term) risk to human health known as Generic Assessment Criteria (GACs). Key human health receptors at the site, identified for the site include site end users (future site users including residents, staff, visitors, neighbours and groundworkers - construction workers and future refurbishment and maintenance workers).

All soil results have been compared against the Geofirma Ltd soil GACs for a residential with plant uptake land use. There is limited potential for exposure pathways in terms of human health from exposed soils once the site has been redeveloped. On this basis, the use of such GACs is considered to be a very conservative assumption given that the proposed soft landscaping on site which comprises ornamental landscaping only, with no areas of usable recreational space or gardens to be constructed. The site will also include a commercial premise at the south of the site, which is a much less sensitive land use in terms of contaminated land risk. GACs based on an assumed Soil Organic Matter (SOM) of 1% on site (which results in the most conservative set of available GACs).

These guideline values have been derived using the updated CLEA v1.071 model, previously published Category 4 Screening Levels (C4SLs) by DEFRA and information in the Environment Agency guidance SR2. Where Geofirma soil SSVs have not been derived, the Category 4 Screening Levels have been used, and for determinands which do not have either of the above, the LQM / CIEH Suitable 4 Use Levels (S4ULs) assessment criteria have been used. A summary of the results and relevant GACs is provided in Appendix J.

Asbestos

All 3 No. samples taken from the Made Ground and the Langley Silt Member (superficial deposit) were analysed for Asbestos. None of the samples were found to contain Asbestos or ACMs. The results of the laboratory asbestos screen corroborated with the absence of visual findings in terms of Asbestos and ACMs during the investigation.

Metals, heavy metals and semi-metals

The concentration of Total Cyanide was below the laboratory detection limit (<1 mg/kg) in all three samples. No exceedances of the relevant GACs were recorded for metals, heavy metals or semi-metals within the three samples of the Made Ground and Langley Silt Member.

TOTAL TPH, BTEX and MTBE

3 No. soil samples taken from the Made Ground and Langley Silt Member did not record concentrations of TPHs (both aliphatic and aromatic fractions) that exceeded the residential with plant uptake land use GACs. Recorded BTEX and MTBE concentrations in all samples were below the detection limit of the analysing equipment (<5 ug/kg).

During the ground investigation, there was no obvious olfactory evidence relating to the TPHs, BTEX or MTBE on site, supporting the findings of the laboratory testing undertaken.

PAHs

A maximum total concentration of PAHs of 22.2 mg/kg was recorded in the sample taken from 1.3m bgl in BH1. The total PAH concentrations in the remaining 2 No. samples were lower ranging between <0.8 mg/kg and 18.5 mg/kg. None of the 3 No. samples taken from the Made Ground and Langley Silt Member were considered to be highly elevated and did not record any exceedances of the relevant GACs.

This supports the PID data obtained as part of groundwater monitoring programme with no vapour risk from groundwater recorded. No elevated ground gas readings, which often act as an indicator of PAHs in soils were recorded during the ground gas monitoring, as detailed in Section 5.4 of this report.

5.4 GROUND GAS MONITORING

A single ground gas monitoring visit was undertaken on 19th December 2024 within the four boreholes installed with standpipes during the ground investigation (BH1, WS1, WS2 and WS3). The monitoring round aimed to confirm the absence of ground gas and vapour risk at the site. Should any potential ground gas risk be realised, based on the findings of the gas monitoring and from the findings of the soil logging and chemical testing on site, then further rounds of ground gas monitoring were to be undertaken, subject to agreement by the Client.

The atmospheric pressure during the monitoring visit was 1002 mb and pressure conditions were stable.

The key hazardous ground gases tested for were methane (CH_4) and carbon dioxide (CO_2), carbon monoxide (CO), hydrogen sulphide (H_2S), as well as a vapour risk from Volatile Organic Compounds (VOCs) in the form of vapours. Vapour concentrations were recorded within the wells as part of the ground gas monitoring using a Photo Ionisation Detector (PID).

Table 11 summarises the ground gas concentrations recorded in BH1, WS1, WS2 and WS3 during the single round of ground gas monitoring undertaken.

Table 11: Summary of Ground Gas Monitoring Data

Date	Borehole No.	Maximum Carbon Dioxide concentrations (% v/v)	Maximum Methane concentrations (% v/v)	Minimum Oxygen concentrations (% v/v)	Peak flow rate (l/hr)
19/12/2024	BH1	0.1	0.0	20.3	0.0
	WS1	0.1	0.0	20.5	0.0
	WS2	0.1	0.0	20.4	0.0
	WS3	0.2	0.0	20.3	0.0

As part of the monitoring no positive PID readings (>1ppm) were recorded on site and no associated odours indicating the presence of vapours were recorded.

No detectable methane was recorded during the visit on site (<0.1%). Therefore, the maximum carbon dioxide concentration has been used to calculate the Gas Screening Value (GSV) for the site. A worst-case scenario approach has been adopted, which takes into account the highest peak flow rate recorded and the highest carbon dioxide ground gas concentration recorded during the various monitoring rounds, irrespective of which borehole in which they were recorded. In this investigation a maximum flow rate of 0.0 l/h (recorded as <0.1 l/h) and a maximum CO_2 concentration of 0.2% v/v were recorded. Using these values, a ground gas screening value (GSV) has been calculated for the site as follows:

GSV = peak flow rate (l/h) x maximum carbon dioxide concentration (%v/v)

GSV = <0.1 l/h x 0.2/100 = < 0.0002 l/h

The maximum carbon dioxide concentration of 0.2% v/v from WS3 and the maximum flow rate, recorded as <0.1 l/h were used to calculate a GSV value of < 0.0002 l/h.

Based on the flow rate measured during the monitoring round in accordance with the NHBC

Traffic Lights Gas Risk Assessment, the site classifies as green or Characteristic Situation 1 when compared to the CIRIA C665 guidance. On this basis and taking into account the absence of contamination recorded on site and the limited thickness of Made Ground recorded (with no organic materials or indicators of significant contamination), the ground gas risk at the site was concluded to be negligible. It is considered that there is sufficient evidence at this stage to rule out a ground gas risk at the site and confirm that no ground gas protection measures are required within the proposed redevelopment scheme.

5.5 CONCLUSIONS AND REQUIREMENT FOR FUTURE WORKS

Samples were tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA). No olfactory evidence of contamination (such as vapours) was identified during sampling. No significant visual evidence of organic contaminants, such as oils, were noted on site, however, there was some evidence of visual contamination in the rare ash. No exceedances of the GACs were recorded in soils and no Asbestos or ACMs were identified.

A maximum carbon dioxide concentration of 0.2% v/v, a maximum methane concentration of <0.1% v/v and a maximum flow rate of <0.0 l/h were used to calculate a GSV value of 0.0002 l/h for the site. Based on this information, the findings of the logging (indicating no significant contamination and a limited thickness of Made Ground), laboratory testing, PID testing and taking into account the site history, it is considered that the site represents a negligible risk from ground gas and vapours. No ground gas protection measures will be required in the final redevelopment scheme.

Based on the findings, no remedial action is considered to be required at the site.

5.6 GUIDANCE AND GOOD PRACTICE MEASURES

No remedial action is required at the site. Following recommendations from the ground investigation, MS4 Architects has sent an Asbestos Demolition Survey by Home Counties Asbestos (Appendix I) to Geofirma on the 7th January 2025. The survey confirms the visual observations during the ground investigation and, the survey recommends that the vinyl tile flooring and bitumen adhesive (ACMs) are removed prior to demolition of the existing on-site building. The asbestos removal works will need to be carried out by a licenced asbestos contractor.

Surplus excavated soils on site will need to be removed from the site and disposed of in accordance with current waste management and Duty of Care regulations. For any potentially contaminated soil that is uncovered (while considered unlikely based on the current findings), Waste Acceptance Criteria (WAC) testing is likely to be required. The scope and nature of which should be agreed with the facility to which the spoil is being transported.

Due to the absence of topsoil and sub-soil on site, consideration to the import of clean capping materials should be made to facilitate the construction of the proposed soft landscaping areas on site.

AppIt is recommended that the following measures are also implemented at the site as standard good working practice:

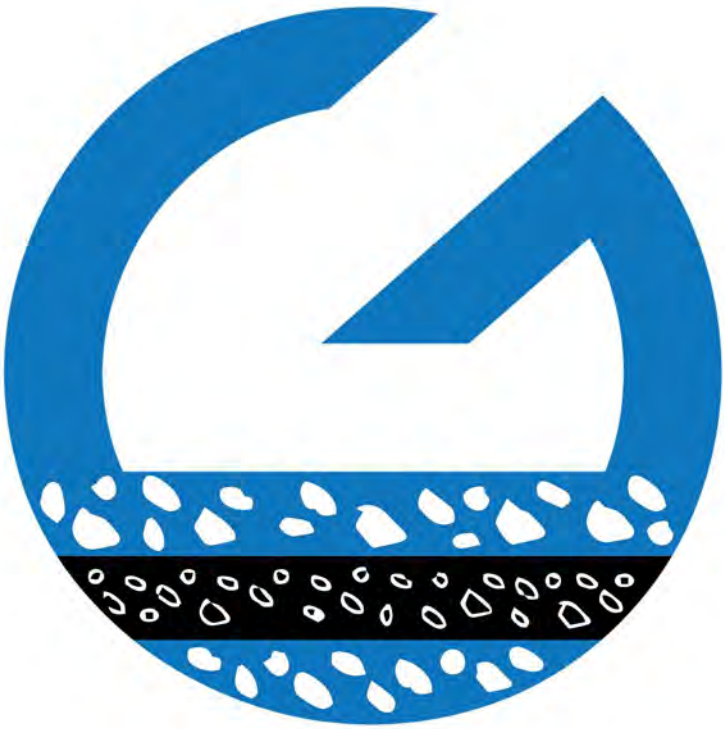
- The separation of staff from Made Ground i.e. physical barriers around areas of

excavation, with limited access, as far as is reasonably practical;

- Limit stockpiling on site due to the proximity of residents. All Made Ground to either be re-used on site or removed off-site as quickly as possible;
- Where possible, limiting the duration when Made Ground, excavations or voids are exposed to the atmosphere and ensure hardstanding (such as concrete slabs) is kept clean and tidy, limiting the potential for soil-derived dusts to be generated;
- The use of sprays and dampening down of soils during excavation to reduce the generation of dust, particularly given the proximity to other properties;
- The use of appropriate Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE) (with the grade of filter specified by a suitable professional to provide protection against asbestos as and when required) during all works;
- Apply with the Control of Asbestos Regulations (CAR 2012) and CL:AIRE Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction and demolition Materials Industry Guidance (CAR-SOIL) should ACMs be encountered on site during the earthworks;
- The appropriate management of unexpected, contaminated materials (i.e. stopping of works, adoption of quarantine measures, minimisation of further impacts to the environment and human health as appropriate);
- Engagement of specialist contractors to advise on the management of unexpected contamination (i.e., a specialist asbestos contractor if required); and
- Maintain a watching brief for contamination throughout the duration of the earthworks. This will focus on any visual or olfactory evidence of contamination (e.g., discoloured soils, unexpected or odours or buried waste). Any unexpected conditions should be investigated by a suitably qualified person and their recommendations implemented.

6 REFERENCES

- British Standards Institution (1990). Methods for tests for soils for civil engineering purposes, BS1377, BSI. London.
- British Standards Institution (1986). Code of practice for foundation design, BS8004, BSI. London.
- British Standards Institution (2004). Geotechnical Design, BS EN 1997-1, BSI. London.
- British Standards Institution (2004). Geotechnical Design, BS EN 1997-2, BSI. London.
- British Standards Institution (2015) BS 5930:2015, Code of Practice for Site Investigation.
- CIRIA (1995) R143. The Standard Penetration Test (SPT): Method and Use.
- Frank et al (2004)– Designers' Guide to EN 1991-1 Eurocode 7: Geotechnical Design – General Rules. Thomas Telford Ltd.
- Lord, J.A. *et al.* (2002) *C574 Engineering in chalk*. London: CIRIA.
- NHBC Standards (2022). Chapter 4.2 Building Near Trees.
- Reports4Planning (2021) Surface Water Management Strategy 152-154 Uxbridge Road, Hayes, Middlesex
- Stroud, M.A and Butler, F.G. (1975). The standard penetration test and the engineering properties of glacial material. In: Proceedings of the Symposium of glacial materials, University of Birmingham, April 1975.



Geofirma

Cardinal Point

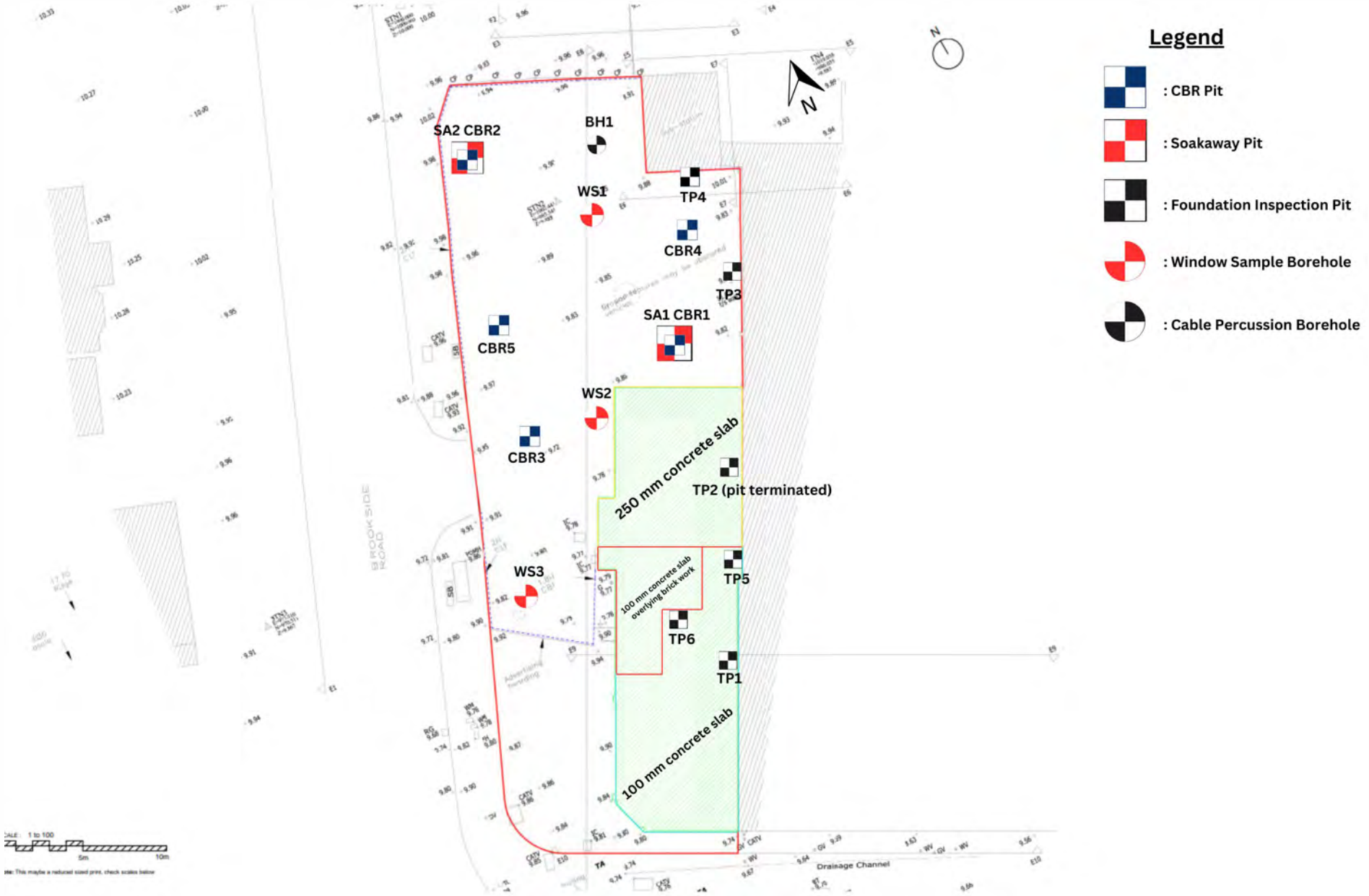
Park Road

Rickmansworth

WD3 1RE

APPENDIX A -

EXPLORATORY HOLE LOCATION PLAN



EXPLORATORY HOLE LOCATION PLAN - EXISTING SITE PLAN

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Client
Sukanth Yoganathan

Site
152-154 Uxbridge Road, Hayes, UB4 0JH

Legend

- : CBR Pit
- : Soakaway Pit
- : Foundation Inspection Pit
- : Window Sample Borehole
- : Cable Percussion Borehole

EXPLORATORY HOLE LOCATION PLAN - PROPOSED SITE PLAN

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Client
Sukanth Yoganathan

Site
152-154 Uxbridge Road, Hayes, UB4 0JH

APPENDIX B –

BOREHOLE AND TRIAL PIT LOG RECORDS

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Borehole Number** BH1
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 150 mm to 4.5 mbgl	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 11/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						0.05				
						(0.20)	TARMAC			
						0.25				
						(0.20)	MADE GROUND: Brown sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of brick and flint.			
0.50	D1					0.45				
0.50-0.90	B2					(0.45)				
						0.90	MADE GROUND: Firm brown and light grey slightly sandy very gravelly CLAY. Gravel is angular medium to coarse of tarmac fragments and flint.			
1.00	D3					(0.70)				
1.20-1.59	SPT(C) N=50			8,13/11,15,18,6			LANGLEY SILT MEMBER: Firm brown silty CLAY.			
1.20-1.70	B4			for 15 mm		1.60				
1.30	ES5						RIVER TERRACE DEPOSITS: Medium dense light orangish brown clayey sandy GRAVEL. Sand is angular coarse. Gravel is rounded to angular fine to coarse of flint.			
1.90	D6									
2.00-2.33	SPT(C) N=50			8,12/19,23,8			RIVER TERRACE DEPOSITS: Dense to very dense yellowish brown sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint.			
2.00-2.50	B7			for 25 mm						
2.90	D8					(2.60)				
3.00-3.45	SPT(C) N=27			2,3/3,4,9,11			@ 2.9 mbgl - Becomes medium dense to dense.			
3.00-3.50	B9									
3.90	D10									
4.00-4.45	SPT(C) N=11			2,2/2,2,3,4						
						4.20				
						(0.30)	LONDON CLAY FORMATION: Firm light grey slightly sandy slightly gravelly silty CLAY. Sand is angular coarse. Gravel is subrounded to angular fine to coarse of flint.			
						4.50				
4.90	D11						LONDON CLAY FORMATION: Firm to stiff light grey silty CLAY.			
5.00-5.45	SPT N=16			2,2/2,4,5,5						
5.00	D12									
6.00-6.45	U13									
6.45	D14									
6.90	D15									
7.00-7.45	SPT N=18			2,2/3,4,5,6			@ 7.0 mbgl - Rare presence of selenite crystals.			
7.00	D16									
7.90	D17									
8.00-8.45	U18									
8.45	D19						@ 8.5 mbgl - Henceforth becomes stiff.			
8.90	D20									
9.00-9.45	SPT N=23			2,2/4,4,7,8						
9.00	D21									
9.90	D22									

Remarks
Installation of a standpipe with slotted response zone from 2.0 m to 4.0 mbgl.
Borehole was backfilled from base of borehole to 5.0 mbgl.
Bentonite seal from ground level to 2.0 mbgl and 4.0 m to 5.0 mbgl.
Handpit dug to 1.2 mbgl.
Groundwater was not encountered during the drilling process however it may have been masked as water was continuously added into the borehole from 1.7 m to 2.9 mbgl to aid in the drilling process.
On the 11/12/2024 shift, the borehole was drilled from ground level to 7.0 mbgl.
On the 12/12/2024 shift, the borehole was drilled from 7.0 mbgl to 20.0 mbgl.

Scale (approx)	Logged By
1:50	KL

Figure No. 2024-065-PRE-UXB.BH1

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site	Borehole Number
152-154 Uxbridge Road, Hayes, London, UB4 0JH	BH1

Machine : Dando 2000 Method : Cable Percussion	Casing Diameter 150 mm to 4.5 mbgl	Ground Level (mOD)	Client Sukanth Yoganathan	Job Number 2024-065-PRE-UXB
	Location	Dates 11/12/2024	Project Contractor Geofirma Ltd	Sheet 2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.00-10.45	U23						LONDON CLAY FORMATION: Stiff light grey silty CLAY.			
10.45	D24									
10.90	D25									
11.50-11.95	SPT N=25			3,3/5,6,6,8						
11.50	D26									
12.00	D27									
						(15.50)				
12.90	D28									
13.00-13.45	U29						@ 13.0 mbgl - Occasional presence of selenite crystals.			
13.45	D30									
13.90	D31						@ 14.0 mbgl - Becomes stiff to very stiff.			
14.50-14.95	SPT N=32			2,5/9,7,7,9						
14.50	D32									
14.90	D33									
15.90	D34									
16.00-16.45	U35									
16.45	D36									
16.90	D37									
17.50-17.95	SPT N=31			3,6/6,7,8,10						
17.50	D38									
18.00	D39									
18.90	D40									
19.00-19.45	U41									
19.40	D42									
19.90	D43						@ 19.85 mbgl - Laminated bedding noted. Clay is slightly friable and brittle			

Remarks
Installation of a standpipe with slotted response zone from 2.0 m to 4.0 mbgl.
Borehole was backfilled from base of borehole to 5.0 mbgl.
Bentonite seal from ground level to 2.0 mbgl and 4.0 m to 5.0 mbgl.
Handpit dug to 1.2 mbgl.
Groundwater was not encountered during the drilling process however it may have been masked as water was continuously added into the borehole from 1.7 m to 2.9 mbgl to aid in the drilling process.
On the 11/12/2024 shift, the borehole was drilled from ground level to 7.0 mbgl.
On the 12/12/2024 shift, the borehole was drilled from 7.0 mbgl to 20.0 mbgl.

Scale (approx)	Logged By
1:50	KL

Figure No.
2024-065-PRE-UXB.BH1

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Borehole Number** BH1
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 150 mm to 4.5 mbgl	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 11/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
20.00-20.38 20.00	SPT N=50 D44			3,5/6,7,37 for 75 mm		20.00	LONDON CLAY FORMATION] Complete at 20.00m			

Remarks
Installation of a standpipe with slotted response zone from 2.0 m to 4.0 mbgl.
Borehole was backfilled from base of borehole to 5.0 mbgl.
Bentonite seal from ground level to 2.0 mbgl and 4.0 m to 5.0 mbgl.
Handpit dug to 1.2 mbgl.
Groundwater was not encountered during the drilling process however it may have been masked as water was continuously added into the borehole from 1.7 m to 2.9 mbgl to aid in the drilling process.
On the 11/12/2024 shift, the borehole was drilled from ground level to 7.0 mbgl.
On the 12/12/2024 shift, the borehole was drilled from 7.0 mbgl to 20.0 mbgl.

Scale (approx)	Logged By
1:50	KL

Figure No. 2024-065-PRE-UXB.BH1

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Number** WS1
Machine : Premier 110 **Method :** Drive-in Windowless Sampler	**Dimensions** See remarks	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 11/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05 (0.40)	TARMAC MADE GROUND: Very soft to soft light grey slightly sandy very gravelly CLAY. Gravel is angular medium to coarse of tarmac fragments and flint.			
0.60	ES1				0.45 (0.75)	LANGLEY SILT MEMBER: Firm light brownish grey slightly gravelly CLAY. Gravel is subrounded to subangular medium of flint.			
1.00-1.45	SPT N=28		3,3/5,7,7,9						
1.30	D2				1.20 (0.50)	LANGLEY SILT MEMBER: Firm to stiff brownish grey very gravelly CLAY. Gravel is subrounded to angular of flint.			
1.70-2.15 1.75	SPT(C) N=68 D3		14,15/15,17,17,19		1.70 1.75	RIVER TERRACE DEPOSITS: Dense to very dense yellowish brown slightly clayey sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint. Complete at 1.75m			

Remarks
Bentonite seal from ground level to 0.25 mbgl and 1.50 m to 1.75 mbgl.
Installation of a standpipe with slotted response zone from 0.25 m to 1.50 mbgl.
Handpit dug to 1.2 mbgl.
No groundwater was enountered during the drilling process.
Liner diameter was: 102 mm at 1.75 mbgl.
Borehole terminated at 1.75 mbgl following SPT. Borehole refused due to dense sandy gravels.

Scale (approx)	Logged By
1:25	KL

Figure No. 2024-065-PRE-UXB.WS1

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Number** WS2
Machine : Premier 110 **Method :** Drive-in Windowless Sampler	**Dimensions** See remarks	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 11/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05	TARMAC			
					(0.40)	MADE GROUND: Firm brown and light grey slightly sandy very gravelly CLAY. Gravel is angular medium to coarse of tarmac fragments and flint.			
					0.45				
0.60	D1					LANGLEY SILT MEMBER: Firm grey light bluish grey stained and black mottled brown gravelly CLAY. Gravel is rounded to subangular medium of flint.			
					(0.75)				
1.00-1.45	SPT N=17		3,4/4,4,4,5						
					1.20				
1.40-1.80	U2					LANGLEY SILT MEMBER: Firm dark grey stained light brown CLAY.			
					(1.10)				
2.00-2.45	SPT(C) N=14		3,3/3,3,4,4						
					2.30				
2.30	D3				(0.20)	RIVER TERRACE DEPOSITS: Yellowish brown loose to medium dense clayey sandy GRAVEL.			
2.50	D4				2.50	RIVER TERRACE DEPOSITS: Medium dense yellowish brown sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint.			
					(0.90)				
3.00-3.45	SPT(C) N=47		7,7/8,10,14,15						
3.20	D5								
					3.40				
					(0.30)	RIVER TERRACE DEPOSITS: Dense to very dense multicoloured sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint.			
3.60-4.05	SPT(C) N=73		11,14/14,17,22,20		3.70				
						Complete at 3.70m			

Remarks
Handpit dug to 1.2 mbgl.
Water seeped into inspection pit overnight and water level had rose to 0.3 mbgl. Water was removed to 1.2 mbgl.
Liner diameter was: 102 mm at 2.0 mbgl, 87 mm at 3.0 mbgl and 77 mm at 3.75 mbgl
Borehole terminated at 3.7 mbgl following SPT. Borehole refused due to dense sandy gravels.
Bentonite seal from ground level to 0.7 mbgl and 3 m to 3.7 mbgl.
Installation of a standpipe with slotted response zone from 0.7 m to 3.0 mbgl.

Scale (approx)	Logged By
1:25	KL

Figure No. 2024-065-PRE-UXB.WS2

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Number** WS3
Machine : Premier 110 **Method :** Drive-in Windowless Sampler	**Dimensions** See remarks	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 11/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.15)	CONCRETE			
					0.15	MADE GROUND: Multicoloured sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular medium of shingle, brick, tarmacadum and brick fragments			
					(0.40)	@ 0.4 mbgl - becomes slightly clayey.			
					0.55	LANGLEY SILT MEMBER: Firm to stiff light grey stained dark brown mottled light brown CLAY. Occasional lenses of sand and gravel. Sand is angular coarse. Gravel is angular fine to medium of flint.			
1.00-1.45	SPT N=27		3,6/6,7,7,7		(0.80)				
1.20	D1								
1.45	D2				1.35				
1.50-1.95	SPT(C) N=71		11,13/16,16,19,20		(0.15)	RIVER TERRACE DEPOSITS: Dense to very dense slightly clayey slightly sandy GRAVEL. Sand is angular coarse. Gravel is subangular to angular fine to coarse of flint.			
					1.50	Complete at 1.50m			

Remarks
Installation of a standpipe with slotted response zone from 0.25 m to 1.25 mbgl.
Bentonite seal from ground level to 0.25 mbgl and 1.25 m to 1.50 mbgl.
Handpit dug to 1.2 mbgl.
No groundwater was enountered during the drilling process.
Liner diameter was: 102 mm at 1.50 mbgl.
Borehole terminated at 1.50 mbgl following SPT. Borehole refused due to dense sandy gravels.

Scale (approx)	Logged By
1:25	KL

Figure No. 2024-065-PRE-UXB.WS3

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Trial Pit Number** SA1
Machine : 2T Excavator **Method :** Trial Pit	**Dimensions** 0.6 m x 1.8 m x 1.3 m (deep)	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 10/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL: Vegetation over loose dark brown slightly gravelly slightly clayey SAND. Gravel is rounded to angular fine to medium of fint and tarmacadum. Sand is angular fine. Rare presence of ash.		
					0.30 (0.15) 0.45	MADE GROUND: Firm brown and light grey slightly sandy very gravelly CLAY. Gravel is angular medium to coarse of tarmac fragments and shingle.		
					(0.85)	LANGLEY SILT MEMBER: Firm light brown slightly gravelly slightly silty CLAY.		
					1.30	Complete at 1.30m		

Remarks

No groundwater was encountered during the pitting process.
Excavation was backfilled from base of excavation to ground level.
Trial pit terminated at 1.3 mbgl. Reached target depth.

North	Scale (approx)	Logged By	Figure No.
	1:25	KL	2024-065-PRE-UXB.SA1

GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

Site 152-154 Uxbridge Road, Hayes, London, UB4 0JH			**Trial Pit Number** SA2
Machine : 2T Excavator **Method :** Trial Pit	**Dimensions** 0.6 m x 2.1 m x 2.8 m (deep)	**Ground Level (mOD)**	**Client** Sukanth Yoganathan	**Job Number** 2024-065-PRE-UXB
	Location	**Dates** 10/12/2024	**Project Contractor** Geofirma Ltd	**Sheet** 1/1

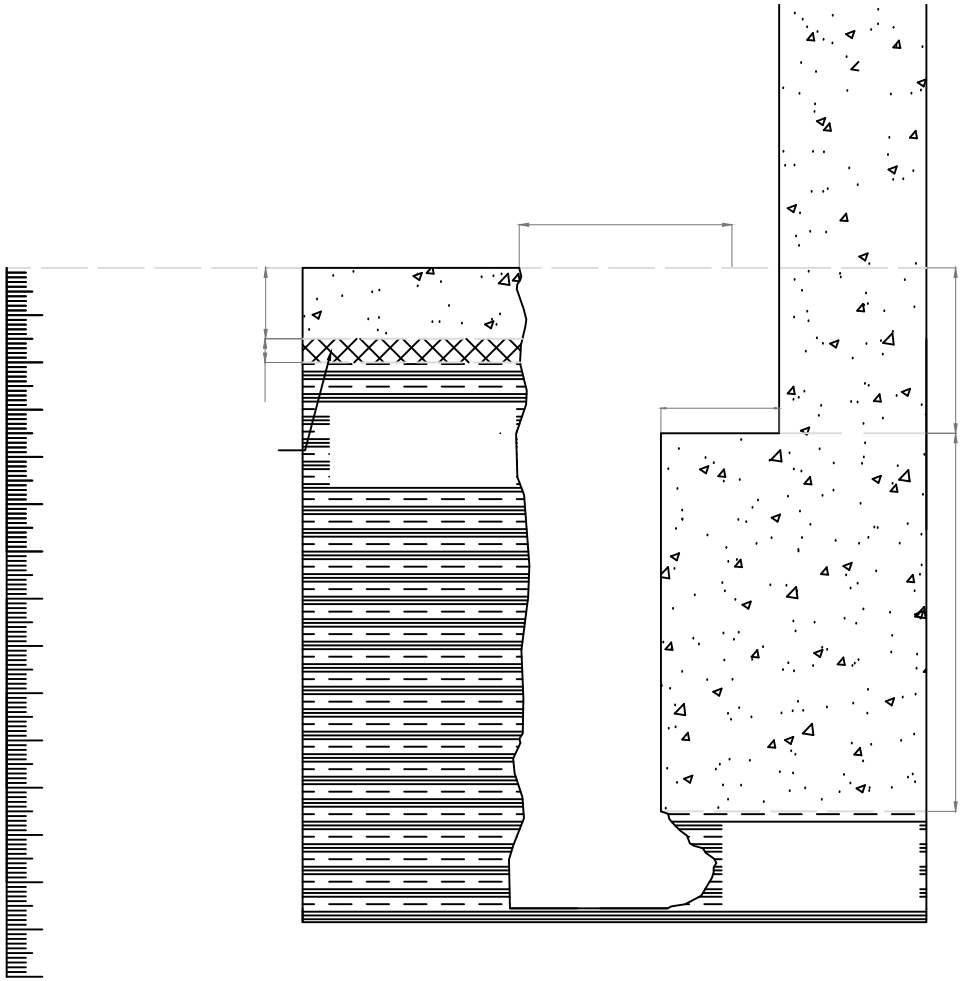
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	TARMAC		
					(0.40)	MADE GROUND: Firm brown and light grey slightly sandy very gravelly CLAY. Gravel is angular medium to coarse of tarmac fragments and flint.		
					0.45	LANGLEY SILT MEMBER: Firm light brown silty CLAY.		
					(1.35)	@ 1.5 mbgl - becomes firm to stiff.		
					1.80	RIVER TERRACE DEPOSITS: Dense yellowish brown sandy GRAVEL. Sand is angular coarse. Gravel is angular medium to coarse of flint.		
					(1.00)			
					2.80	Complete at 2.80m		

Remarks

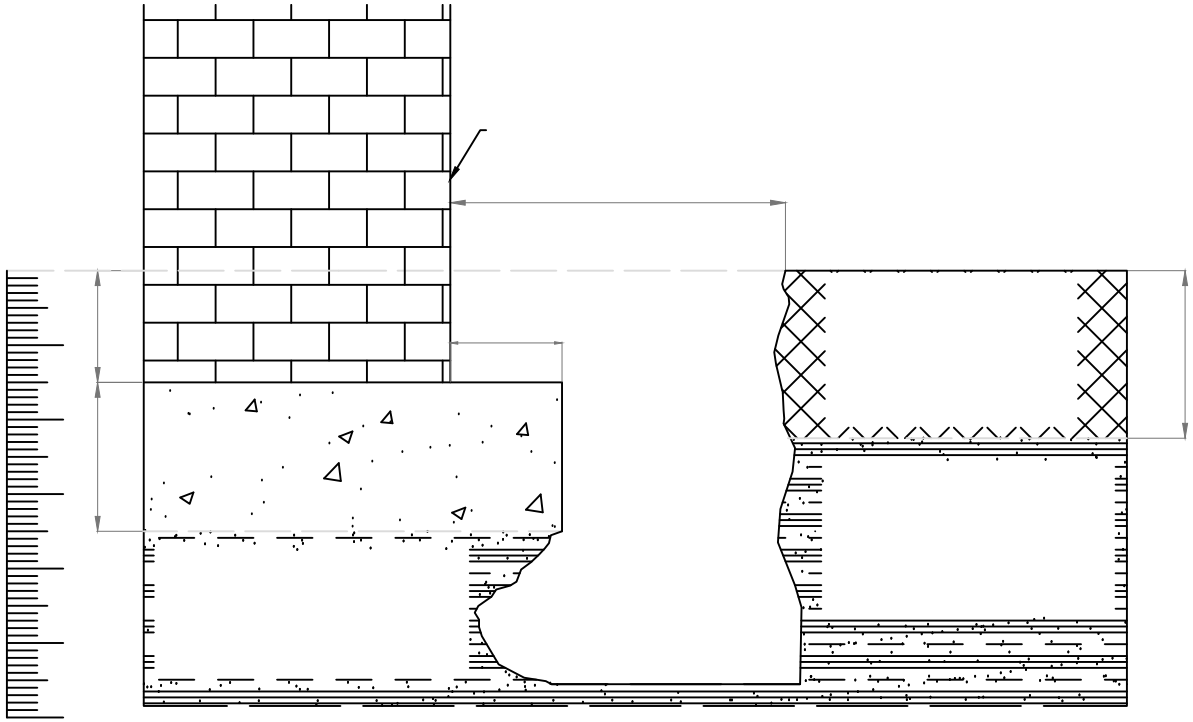
Trial pit terminated at 2.8 mbgl. Reached target depth.
Excavation was backfilled from base of excavation to ground level.
No groundwater was encountered during the pitting process.

North	Scale (approx)	Logged By	Figure No.
↗	1:25	KL	2024-065-PRE-UXB.SA2

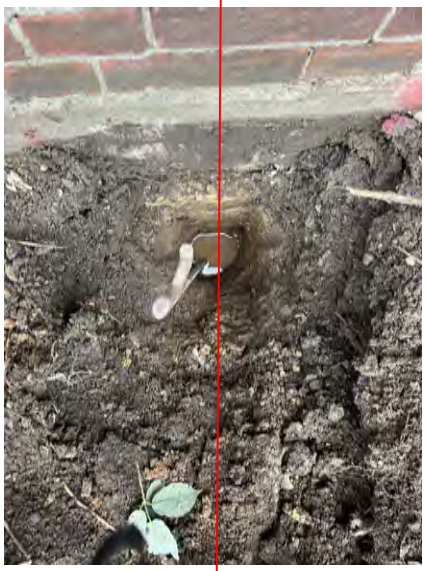
GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

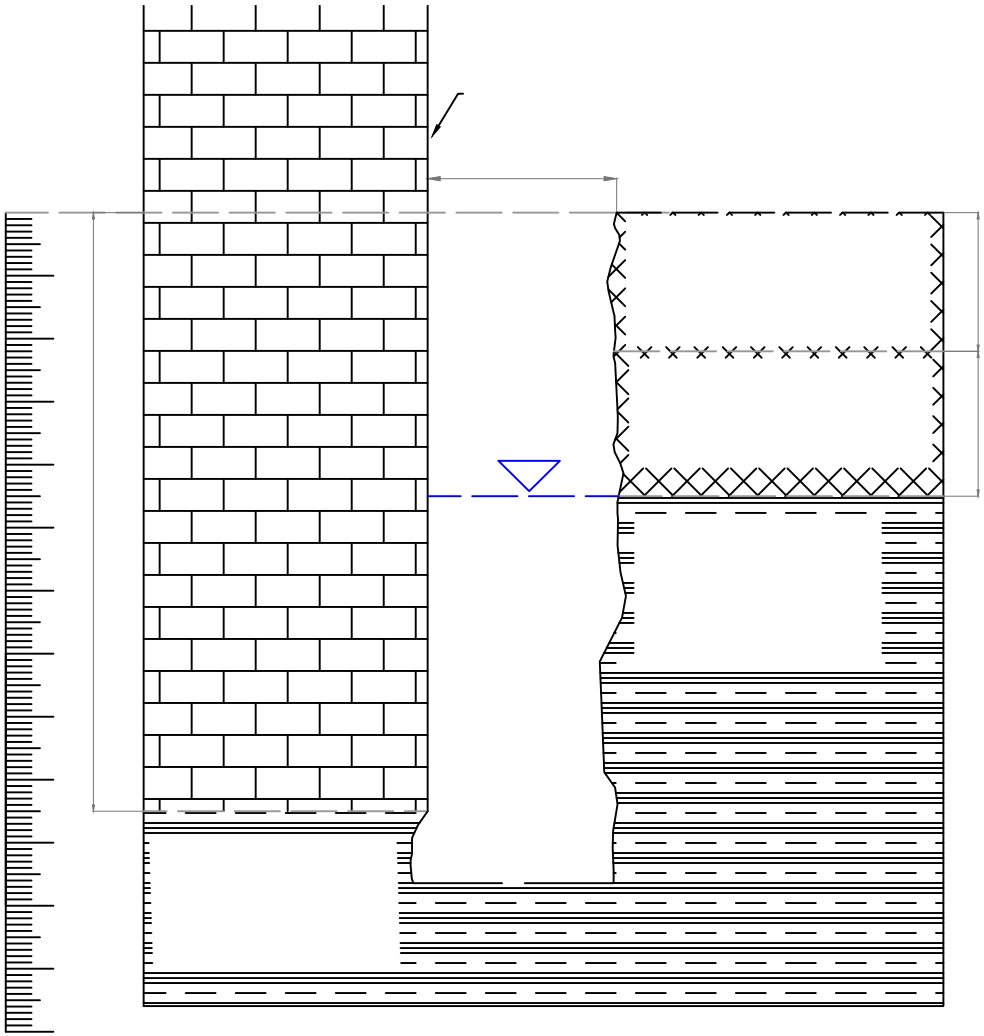


GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS

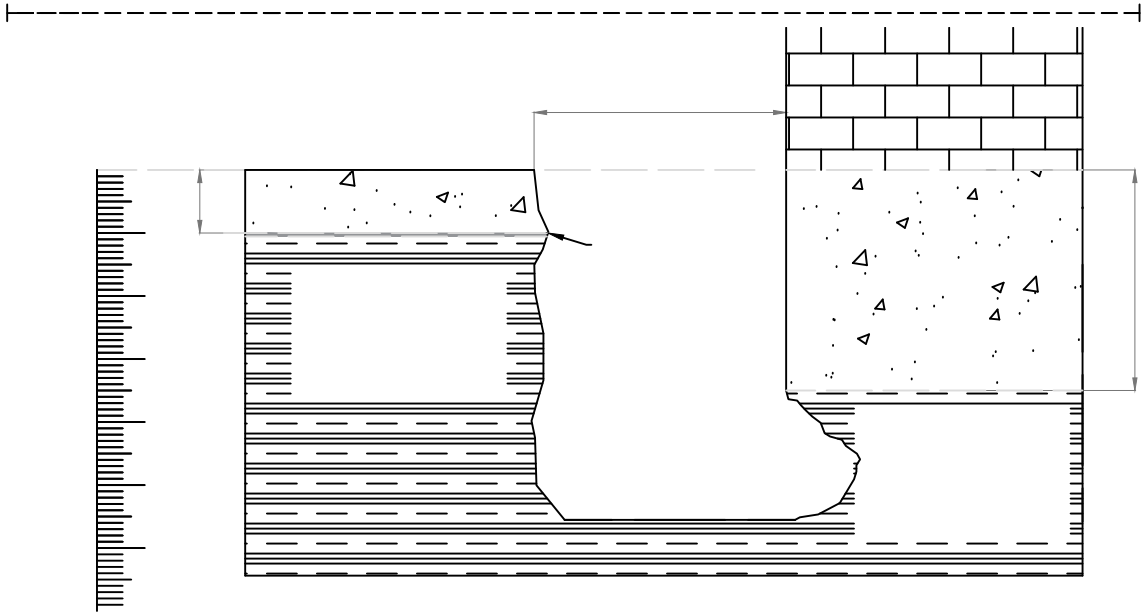


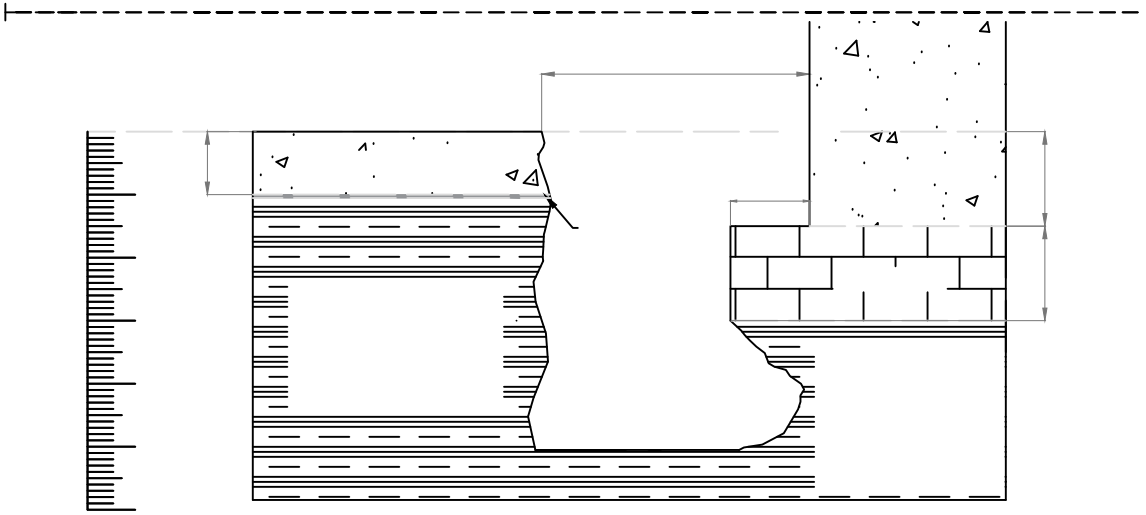
GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS



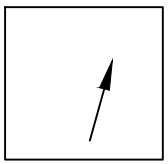


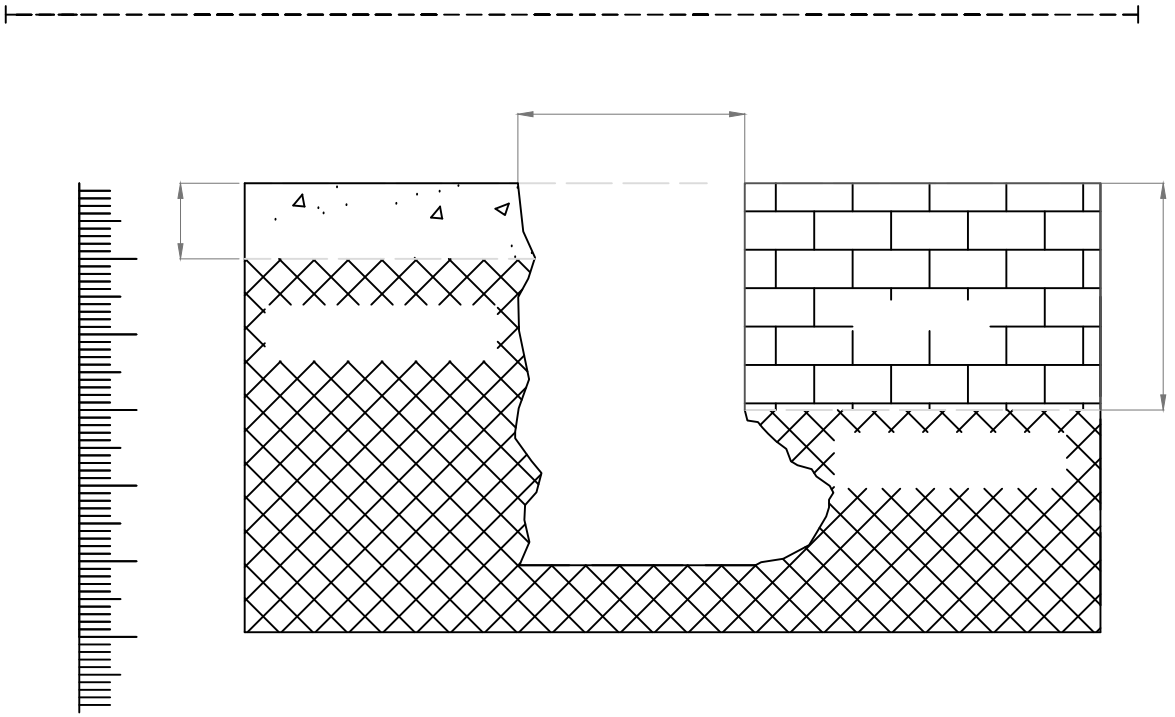
GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS





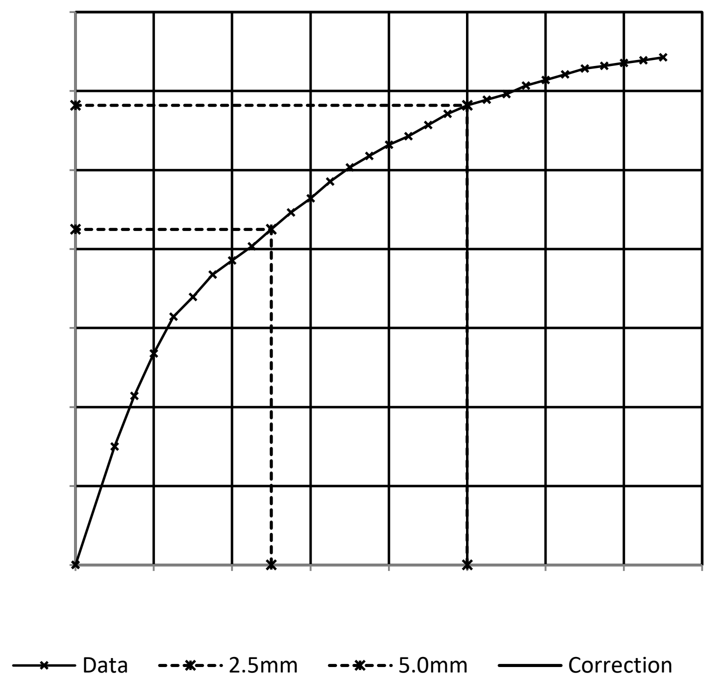
GEOFIRMA
GEOTECHNICAL & CIVIL ENGINEERING CONSULTANTS



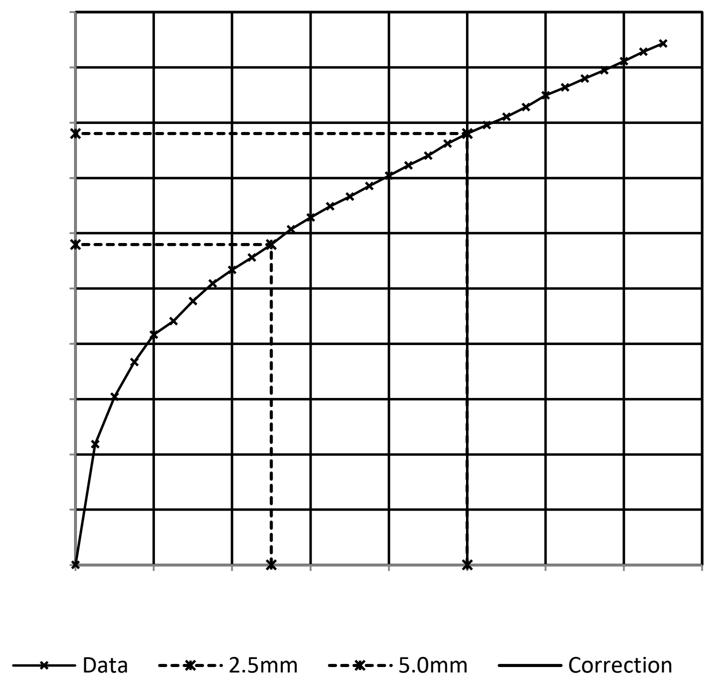


APPENDIX E –
IN SITU TEST RESULTS

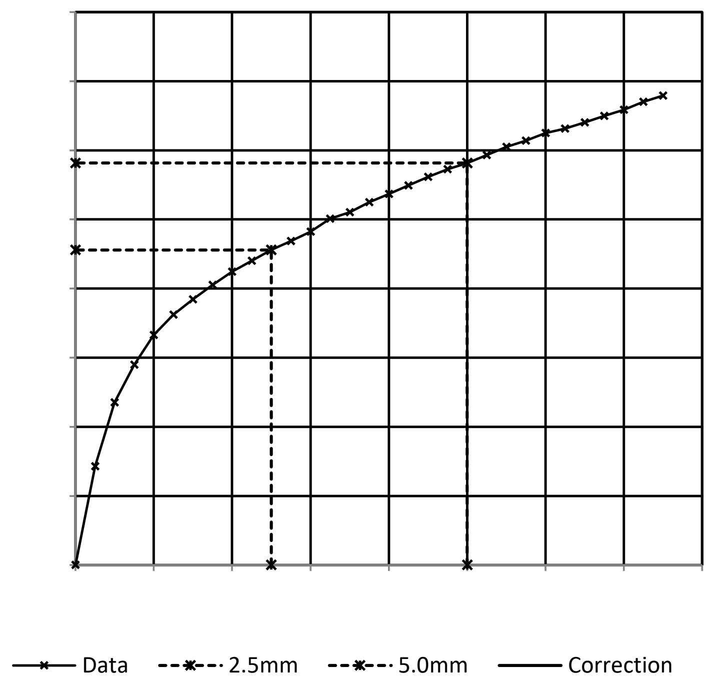
Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm



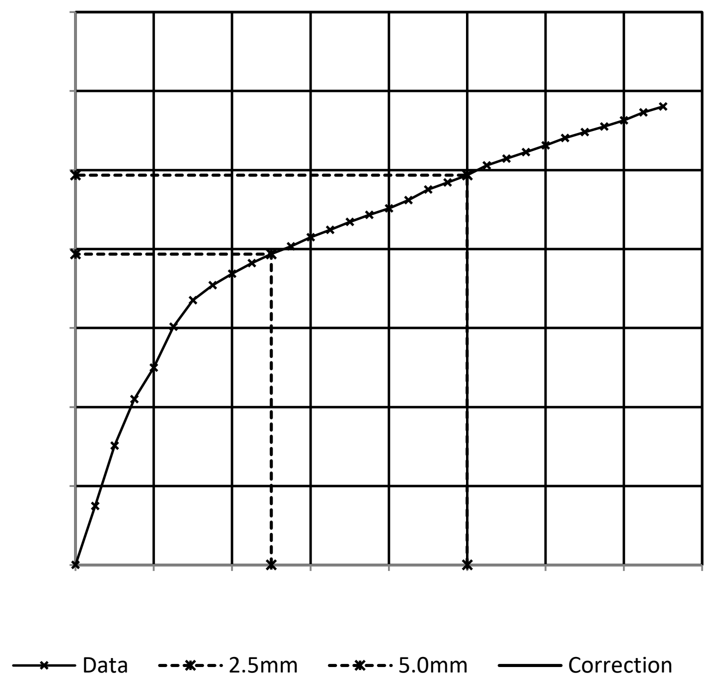
Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm



Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm



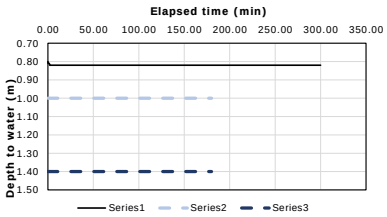
Note: Test only applicable when maximum particle size beneath the plunger does not exceed 20mm



NOTE: The report shall not be reproduced except in full without authority of the laboratory These results only apply to the locations tested.

CALCULATION INFILTRATION RATE - SA1 SOAKAWAY 1

Elapsed time (min)	Depth to water (m)
0.00	0.80
0.17	0.81
0.33	0.81
0.50	0.81
0.67	0.81
0.83	0.81
1.00	0.81
1.50	0.81
2.00	0.82
2.50	0.82
3.00	0.82
3.50	0.82
4.00	0.82
4.50	0.82
5.00	0.82
5.50	0.82
6.00	0.82
7.00	0.82
8.00	0.82
9.00	0.82
10.00	0.82
12.00	0.82
14.00	0.82
16.00	0.82
18.00	0.82
20.00	0.82
25.00	0.82
30.00	0.82
40.00	0.82
50.00	0.82
60.00	0.82
90.00	0.82
120.00	0.82
150.00	0.82
180.00	0.82
210.00	0.82
240.00	0.82
270.00	0.82
300.00	0.82



1) Define the dimensions of the Soakaway Pit

Length (m)	1.80
width (m)	0.60
Effective storage depth (m)	0.80

2) Depths at start and end of the test

Start Depth (m)	0.5
End Depth (m)	1.3

3) Define the elapsed time for the water level to fall 75% and 25% of the effective depth - From the graph

Interpollation for 75%

		Depth (m)		Time (min)	
Time 75% (min)	N/A	Depth A		Time A	
75% effective depth (m)	1	Depth B		Time B	

Interpollation for 25%

		Depth (m)		Time (min)	
Time 25% (min)	N/A	Depth A		Time A	
25% effective depth (m)	1.4	Depth B		Time B	

4) Define the void space of the granular fill used (if used)

% void in granular fill	0

5) Compute effective storage volume of water (VP75-VP25)

Area of Pit x Depth of outflow

Pit Area (m2)	1.08
Outflow Depth (m)	0.4
75% effective depth (m)	1
25% effective depth (m)	1.4
With Granular fill	
Effective storage volume (m3)	0
Without granular fill	
Effective storage volume (m3)	0.432

6) Compute outflow Mean surface area a50

With Granular fill	
Mean surface area (m2)	3
Without granular fill	
Mean surface area (m2)	1.92

6) Compute outflow time

Time 75% (min)	N/A		
Time 25% (min)	N/A		
Outflow time (min)	N/A	Outflow time (seg)	N/A

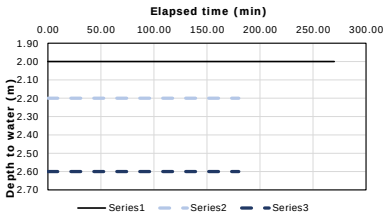
7) Compute soil infiltration rate

With Granular fill
Soil infiltration rate (m/s) N/A

Without granular fill
Soil infiltration rate (m/s) N/A

CALCULATION INFILTRATION RATE - SA2 SOAKAWAY 1

Elapsed time (min)	Depth to water (m)
0.00	2.00
0.17	2.00
0.33	2.00
0.50	2.00
0.67	2.00
0.83	2.00
1.00	2.00
1.50	2.00
2.00	2.00
2.50	2.00
3.00	2.00
3.50	2.00
4.00	2.00
4.50	2.00
5.00	2.00
5.50	2.00
6.00	2.00
7.00	2.00
8.00	2.00
9.00	2.00
10.00	2.00
12.00	2.00
14.00	2.00
16.00	2.00
18.00	2.00
20.00	2.00
25.00	2.00
30.00	2.00
40.00	2.00
50.00	2.00
60.00	2.00
90.00	2.00
120.00	2.00
150.00	2.00
180.00	2.00
210.00	2.00
240.00	2.00
270.00	2.00



1) Define the dimensions of the Soakaway Pit

Length (m)	2.10
width (m)	0.60
Effective storage depth (m)	0.80

2) Depths at start and end of the test

Start Depth (m)	2.0
End Depth (m)	2.8

3) Define the elapsed time for the water level to fall 75% and 25% of the effective depth - From the graph

Interpollation for 75%

		Depth (m)		Time (min)	
Time 75% (min)	N/A	Depth A		Time A	
75% effective depth (m)	2.2	Depth B		Time B	

Interpollation for 25%

		Depth (m)		Time (min)	
Time 25% (min)	N/A	Depth A		Time A	
25% effective depth (m)	2.6	Depth B		Time B	

4) Define the void space of the granular fill used (if used)

% void in granular fill	0

5) Compute effective storage volume of water (VP75-VP25)

Area of Pit x Depth of outflow

Pit Area (m2)	1.26
Outflow Depth (m)	0.4
75% effective depth (m)	2.2
25% effective depth (m)	2.6
With Granular fill	
Effective storage volume (m3)	0
Without granular fill	
Effective storage volume (m3)	0.504

6) Compute outflow Mean surface area a50

With Granular fill	
Mean surface area (m2)	3.42
Without granular fill	
Mean surface area (m2)	2.16

6) Compute outflow time

Time 75% (min)	N/A		
Time 25% (min)	N/A		
Outflow time (min)	N/A	Outflow time (seg)	N/A

7) Compute soil infiltration rate

With Granular fill
Soil infiltration rate (m/s) N/A

Without granular fill
Soil infiltration rate (m/s) N/A

APPENDIX F –
MONITORING RESULTS

GAS MONITORING SHEET

PADDOCK GEO ENGINEERING

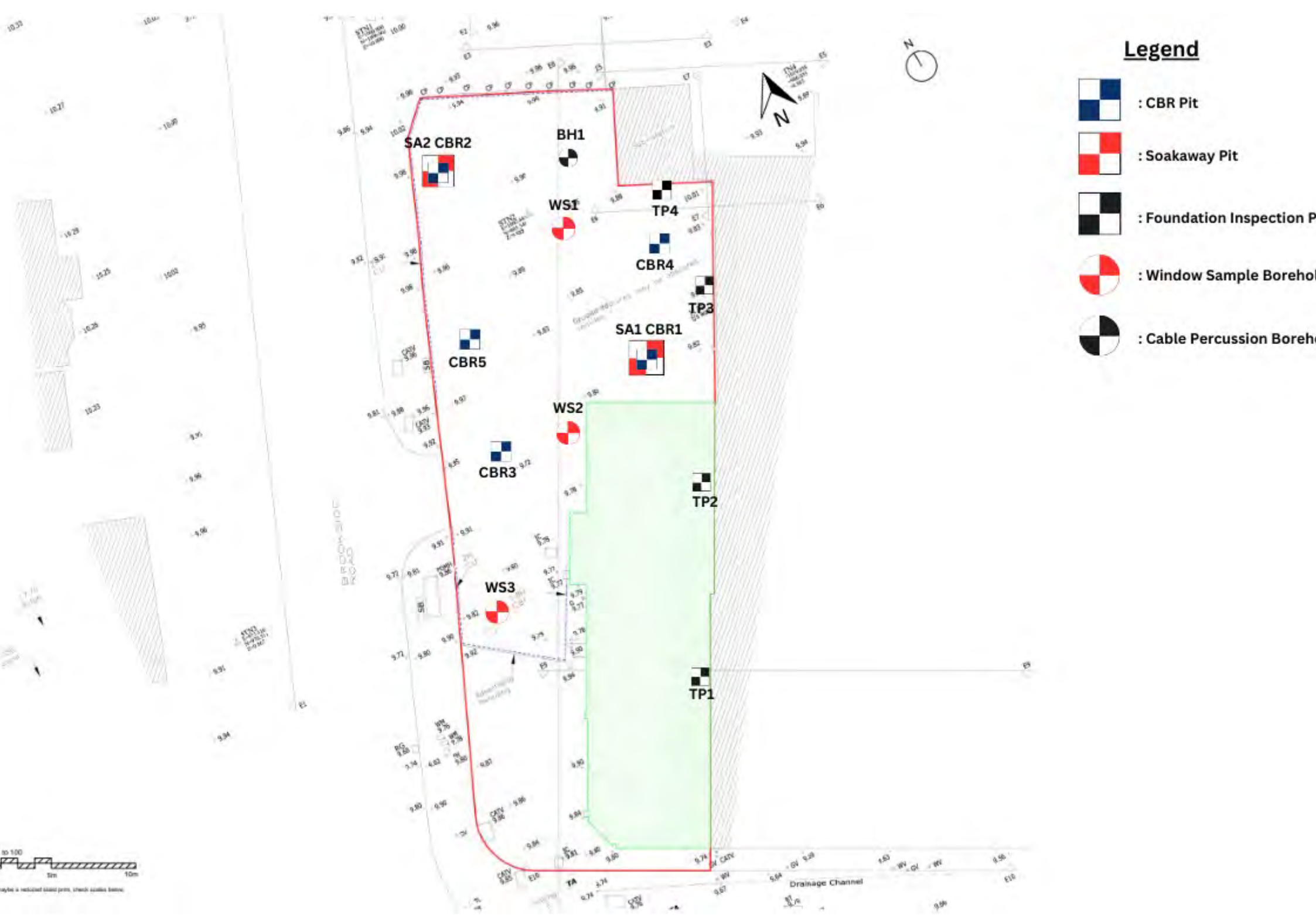
Site: 152-154 Uxbridge Rd, Hayes, UB4 0JH

Project: P24-425

											Max CH4: 0			Max CO2: 0.2			Min O2: 20.2			Max VOC: 0			Max 0 L/hr
											GSV CH4: 0			GSV CO2: 0.0002									
Visit no	Loc.	Date & Time	Op.	Temp °C	Weather	DP	Atmos. Pressure	Water level (mbgl)	[Base]	Pipe Proud (m)	CH4 seconds			CO2 seconds			O2 seconds			VOC	H2S	CO	Peak flow (L/hr)
											30	120	St	30	120	St	30	120	St	St			
1	WS3	19/12/2024 10:20	AA	13	Cloudy	0.0	1002	1.26	1.28	-0.11	0.00	0.00	0.00	0.10	0.10	0.10	20.3	20.3	20.3	0.00	0.00	0.00	0.00
1	WS2	19/12/2024 10:30	AA	13	Cloudy	0.0	1002	3.12	3.14	-0.13	0.00	0.00	0.00	0.10	0.10	0.10	20.5	20.3	20.3	0.00	0.00	0.00	0.00
1	WS1	19/12/2024 10:40	AA	13	Cloudy	0.0	1002	0.62	1.10	-0.02	0.00	0.00	0.00	0.10	0.10	0.10	20.4	20.3	20.3	0.00	0.00	0.00	0.00
1	BH1	19/12/2024 10:50	AA	13	Cloudy	0.0	1002	3.18	3.85	-0.14	0.00	0.00	0.00	**0.20**	0.10	0.10	20.3	**20.2**	**20.2**	0.00	0.00	0.00	0.00

Comments:

Monitoring underaken in accordance with BS 8576 : 2013, results provided above are 'raw data'. Flow is taken as the reading after the standpipe is purged, resealed for 10 minutes then re-measured.

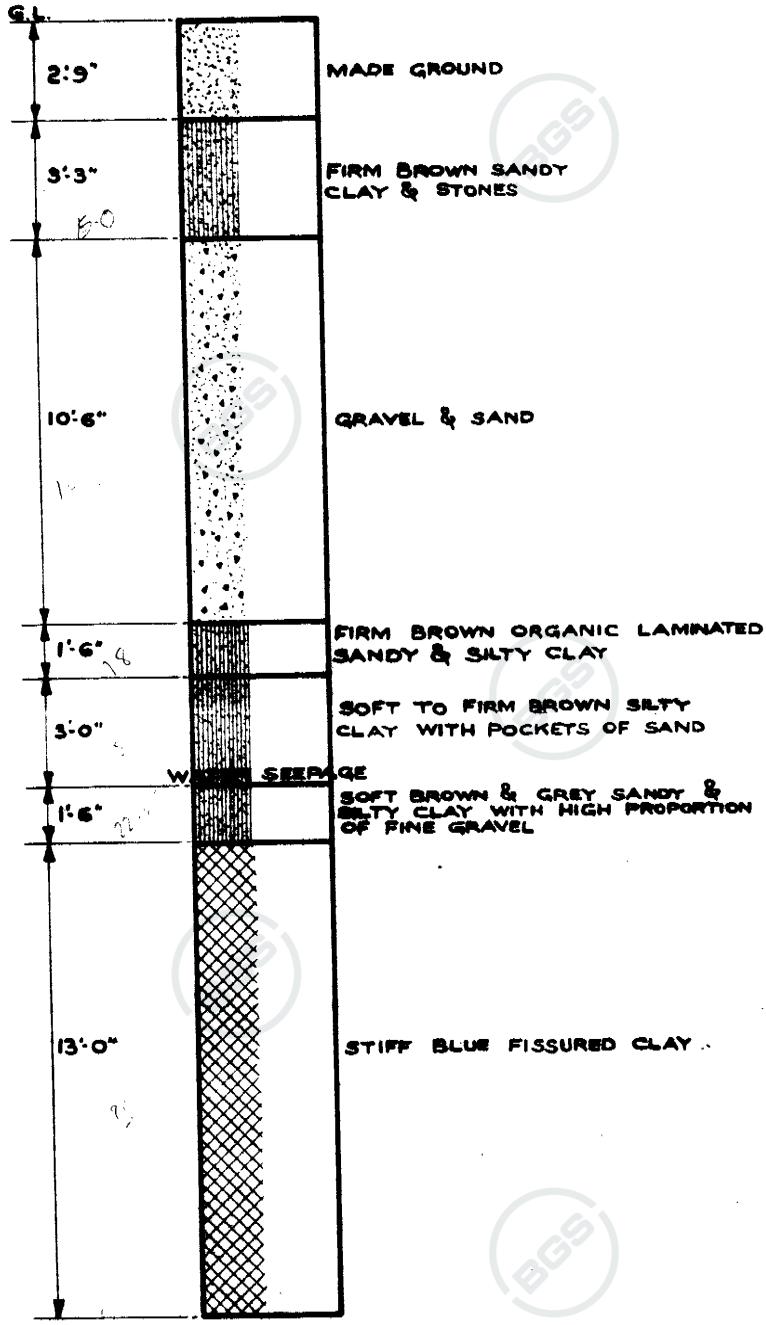

SA2 CBR2
BH1
WS1
TP4
CBR4
TP3
SA1 CBR1
CBR5
WS2
CBR3
TP2
WS3
TP1
BROOKSIDE ROAD
Drainage Channel
N
Legend
: CBR Pit
: Soakaway Pit
: Foundation Inspection P
: Window Sample Boreho
: Cable Percussion Boreh

APPENDIX G –
HISTORICAL AND NEARBY BOREHOLE LOGS (BGS)

14

TQ 18 SW/7
1141 8071

4

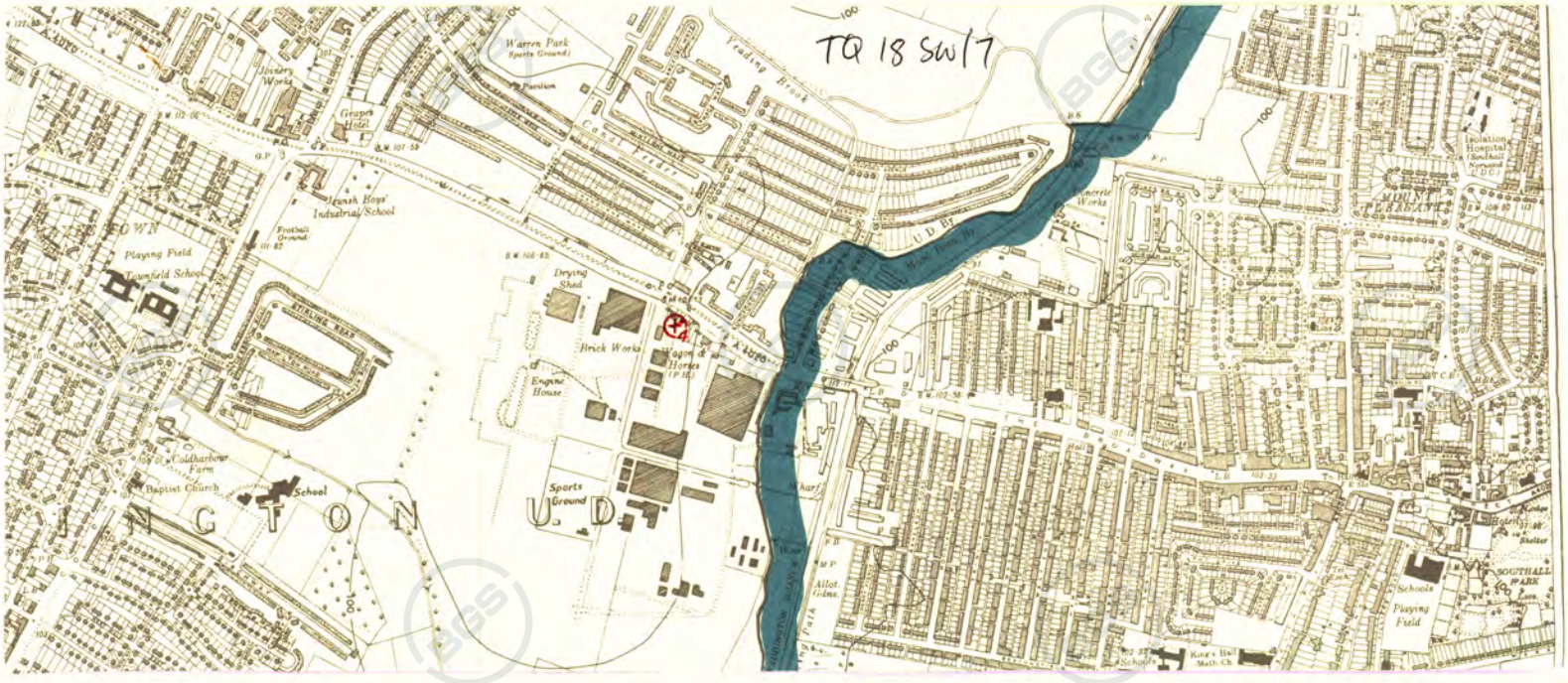


TAKEN FOR 12 STORY OFFICE BLOCKS

DATE:- JUNE 1961

TOTAL DEPTH 35:6" DIA. 6"

LOCATION UXBRIDGE ROAD AND SPRINGFIELD ROAD (EAST SIDE)


TQ 18 SW 7
Warren Park Sports Ground
Pavilion
Trading Brook
Canal Feeder
Grapes Hotel
Hosiery Works
Jewish Boys' Industrial School
Football Ground
Playing Field
Brunfield School
Drying Shed
Brick Works
Wagon & Horses (P.H.)
Engine House
Coldharbour Farm
Baptist Church
School
Sports Ground
Allot. Gdns.
Isolation Hospital
Schools Playing Field
SOUTHALL PARK
Shelter

APPENDIX H -

PHASE 1 CONTAMINATED LAND ASSESSMENT

REPORTS 4 PLANNING
A DIVISION OF BROWN FISHER ENVIRONMENTAL LLP

Head Office
Barley House
Cedar Drive
Snitterfield
Stratford-upon-Avon
Warwickshire
CV37 OLJ

tel: 0845 680 1723
e: enquiries@reports4planning.co.uk

Client:
Kumarasamy Sivakumaran
68 Roth Drive
Hutton
Essex
CM13 2UE

Phase I Land Contamination Assessment

152-154 UXBRIDGE ROAD
LONDON
UB4 0JH

Consultant:
Nick Hillard MSc BSc (Hons)

Consultant in Contaminated Land

Report Ref: 21CLR5516NH

Report Date: 13th December 2021

Executive Summary

Reports 4 Planning has been commissioned by Kumarasamy Sivakumaran to undertake a Phase I Land Contamination Assessment of a site at 152-154 Uxbridge Road, London, UB4 0JH. The report is required to assess potential risks of land contamination associated with the proposed residential redevelopment of the site.

The site currently supports an end of terrace property, with a retail shop at ground floor level, residential accommodation above and a rear yard area, used for access, storage and miscellaneous parking purposes. No obvious evidence of significant contamination or other significant environmental concern was noted during the site reconnaissance. The electrical substation adjacent to the north east corner of the site has been present since at least the early 1970's. However, all electrical infrastructure is housed and contained in a red, fully-enclosed brick-built structure that would limit the unforeseen release of potentially contaminative materials (especially oils) into the subsurface.

The historical evidence indicates that the subject site was developed from greenfield as part of a small terrace of properties in the first half of the twentieth century. This use has continued to the present day. Surrounding land use north of Uxbridge Road has been predominantly residential. Potentially contaminative extractive industry (associated with Brookside Brickworks) and other industrial development of the area south of Uxbridge Road has been recorded. Further to this activity, the Minet Landfill (120m west of the site) was recorded to have received inert waste materials during the late 1980's. Notwithstanding this, underlying superficial ground conditions are of low permeability and previous site investigations at development sites in the immediate vicinity have recorded no elevated ground gas levels.

A motor vehicle garage, incorporating bulk fuel storage facilities, was historically located immediately across Uxbridge Road at Number 27. Intrusive investigation of this site was completed in 2012 prior to the garage redevelopment to a hotel use. No soil-, water- or air-borne contamination was identified at that time.

The underlying ground conditions comprise low permeability Langley Silt. The setting of the site is considered to be of low to moderate environmental sensitivity due to the non-productive nature of the underlying strata, the distance to surface water courses and the residential nature of the proposed development and its surroundings.

The conceptual model of the site demonstrates that potential pollutant linkages are generally of a very low to low risk to human health and to the natural environment during both the construction and post-construction phases of the redevelopment project.

Based on the available information, no significant contamination concerns to impact the proposed workshop development of the site have been identified. No significant pollutant pathways have been identified which may give rise to unacceptable risk at the site.

No further investigation of the site is considered necessary at this stage.

The report is based on the assumption by the author that should instances of previously unreported contamination be found during the proposed works, then appropriate assessment of the risks and proposed remediation scheme will be required. The report is supplied subject to our standard terms and conditions and these should be read alongside the report.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

Reports 4 Planning has been commissioned by Kumarasamy Sivakumaran to undertake a Phase I Land Contamination Assessment of a site at 152-154 Uxbridge Road, London, UB4 0JH.

A Phase I Land Contamination Assessment incorporating a Preliminary Risk Assessment has been recommended in pre-application advice provided by the London Borough of Hillingdon. In particular, the following issues were highlighted:

- The site is within a 250m buffer zone of a former landfill site;
- Made Ground is likely to be present;
- An electricity substation is adjacent;
- The presence of asbestos-containing materials cannot be discounted.

The Phase I Land Contamination Assessment is required in order to highlight potential risks associated with contamination, if present.

In considering the application the Local Planning Authority has to determine 'whether, as a result of the proposed change of use, taking into account any proposed mitigation, the site will be contaminated land as described in Part 2A of the Environmental Protection Act 1990, and in doing so have regard to the Contaminated Land Statutory Guidance issued by the Secretary of State for the Environment, Food and Rural Affairs in April 2012. The client should also take note and abide by the requirements of the new LCRM regulations which is the latest guidelines issued by Government Environment Agency Published on 08/10/2020.

The purpose of this Phase I Desk study and Preliminary Risk Assessment report is to gather information on the site to develop an initial conceptual site model (CSM) and establish whether or not there are any potentially unacceptable risks posed by either current or historical use of the land or the surrounding area which may affect the proposed development. The assessment has been undertaken in line with CLR 11 Model Procedures for the Management of Land Contamination and BS10175:2011 Investigation of Potentially Contaminated Sites. The consultant who has prepared this report is an environmental risk specialist, with over twenty-five years' experience in environmental liability appraisal, contaminated land assessment, brownfield development and risk assessment. The Preliminary Risk Assessment report was undertaken based on Desk Study findings utilising publicly available data, along with data sourced directly and indirectly from various providers including the Environment Agency, the Local Authority, the British Geological Survey, The Coal Authority and Ordnance Survey. This has allowed characterization of the site with respect to its Geology, Hydrology, Hydrogeology, History and Environmental Setting. The Site Characterisation has been undertaken in general accordance with the procedures of the new LCRM methods as released in October 2020.

Predominantly these procedures relate to 'past' contamination, and assume that legislative controls such as Pollution Prevention and Control authorisations control current potentially polluting activities. Emphasis is therefore upon historic site use and how this may affect potential future users of the site should the proposed development plans be realised. A Preliminary Environmental Risk Assessment contained in this report has considered all the relevant Receptors, potential Pathways, and Sources of contamination and assessed these for the level of risk posed to the site and future site users.

In accordance with current guidance the information has been used to develop a Conceptual Site Model (CSM) for the site. Pollutant linkages must be present and the consequent linkage must be established in order to determine the requirement and scope of any future geo-environmental investigation.

Reasonable skill and care have been exercised in preparation of this report in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking this contamination assessment, it is possible that ground conditions other than that potentially indicated by this report may exist at the site.

2.0 SOURCES OF INFORMATION

This report draws upon many different information sources in order to gain a full understanding of the environmental setting of the site. These are summarized below:

2.1 Internet Sources

British Geological Survey Borehole Database
Environment Agency Pollution Inventory Database
Multi-Agency Geographic Information for the Countryside Database
1:50,000 British Geological Survey Digital Map of Great Britain
www.magic.defra.gov.uk

2.2 Reports

Groundsure Dataset Report, GS-8359871; and
Groundsure Historical Maps, GS-8359870.

2.3 London Borough of Hillingdon Information

A review of publicly-available information retained by the London Borough of Hillingdon was integrated into this assessment.

2.4 Site Observations

Site observations have been made during a site reconnaissance on 17th November 2021 and photographic evidence is provided in Appendix A.

3.0 SITE RECONNAISSANCE

3.1 Site Location

The site is located at 152-154 Uxbridge Road, London UB4 0JH and extends to approximately 700 square metres in plan area.

The site is located on the Uxbridge Road at its junction with Brookside Road.

The site is located at Grid Reference 511413, 180816 (TQ 114 808).

Figure 1 and 2- Site Location Plan Small and Large, Figure 3 – Aerial Photograph and Figure 4 - Proposed Site Plans shows the location of the site in relation to its surrounding land uses.

3.2 Site Access

Access to the property is afforded off both Uxbridge Road and Brookside Road.

3.3 Site Description

The site currently supports an end of terrace property fronting onto the northern side of Uxbridge Road, with a retail shop at ground floor level and residential accommodation above. The site forms part of a retail parade (124-154 Uxbridge Road), comprising 8no. retail units. The subject site extends beyond the side elevation of the parade supporting a yard area on the eastern side of Brookside Road.

The retail unit at 152-154 Uxbridge Road is currently occupied by "Home Needs Superstore" selling a wide variety of primarily domestic products. Inspection of the internal areas of the shop revealed no obvious environmental concerns. The majority of the area is taken up by shelving units, with additional storage, toilet and wash basin facilities located to the rear of the premises. The first and second floors of the property support a residential use.

To the side of the property, extending to Brookside Road, is a large advertising hoarding. LPG gas cannisters were noted to be stored in lockable cages to the front and rear of this hoarding.

The rear yard area is used for access, storage and parking of vehicles. 2no. 1100 litres waste eurobins were noted in this area, close to the rear access to the retail unit. At the time of the site reconnaissance, a total of 5no. cars were parked in the yard.

An aerial photograph showing the site is provided as Figure 3 with photographs taken during the site reconnaissance visit provided in Appendix A.

3.3.1 Site Topography

The site is reasonably flat with no discernible changes in topography across the site.

3.3.2 Structures

The property appears to be in a good structural condition with no obvious failings noted.

3.3.3 Surfacing

The site surfacing forms a mixture of concrete hardstanding, tarmac and compacted earth. In the yard areas that were not covered in hardstanding, tyre marks in the soft standing highlighted its recent use for parking vehicles. At the time of the site reconnaissance, some ponding of surface water on the rear yard are was evident. No obvious hydrocarbon sheens

were noted on the surface of this water and no evidence of staining or other environmental concern was noted.

3.3.4 Vegetation

Vegetation is confined to the peripheral areas of the rear yard area where parked vehicles have struggled to access. Vegetation types are typical of disturbed scrub and verge environments – nettle (*Urtica dioica),* bramble *(Rubus fruticosus)*, plantain (*Plantago* spp.) etc.

3.3.5 Underground and Aboveground Storage Tanks

No evidence was observed which would suggest that any above or below ground fuel tanks are present on the site.

3.3.6 Raw Material and Chemical Use and Storage

No evidence of potentially harmful raw material or chemical use and/or storage was observed at the site at the time of the survey.

3.3.7 Solid Wastes

No evidence of potentially harmful solid wastes were observed at the site at the time of the survey.

3.3.8 Hazardous and Industrial Waste

No potentially hazardous industrial wastes have been observed. The site does not operate any process which is likely to use or generate hazardous substances.

3.3.9 Air Emissions

No evidence of significant air emission sources was observed. The site is however located in Hillingdon's Air Quality Management Area and the Ossie Garvin Air Quality Focus Area

3.3.10 Wastewater / Sewers

Wastewater from the site building currently enters the municipal drainage network.

3.3.11 Stormwater

Stormwater from the site building appears to be directed to drains beneath the site. The condition of such drains is unknown.

3.3.12 Asbestos Containing Materials (ACM)

No certified asbestos survey was undertaken as part of this assessment. Given the age of the building, the presence of such materials within the building fabric cannot be discounted. Suitable precautionary measures will be required as part of any proposed major refurbishment or demolition.

3.3.13 Polychlorinated Biphenyls (PCBs)

PCBs were historically used as a dielectric filler liquid in some types of transformers, switchgear, capacitors and the starter units in some fluorescent lights and fractional horsepower motors. PCBs are known to harm the environment and can damage health.

An electricity substation is located immediately adjacent to the north eastern corner of the site. This electrical infrastructure is housed in a red, fully-enclosed brick-built structure accessed via the track to the rear of the site. No obvious evidence of significant contamination associated with this adjacent substation was noted.

3.3.14 Ionising Radiation

No evidence of ionising radiation sources was made at the site.

3.3.15 Spills and Releases

In those external areas of the site which were inspected, no significant areas of staining associated with spills and/or releases could be seen.

3.4 Surrounding Land Use

3.4.1 South

The southern boundary of the site is formed by the Uxbridge Road, across which is general industrial, retail park and commercial land use including the 12 storey high Hyatt Hotel.

3.4.2 East

The site is bordered to the east by 148-150 Uxbridge Road, currently occupied by Desi Tadka restaurant.

3.4.3 North

The site is bordered to the north by an electricity substation and an access road running perpendicular to Brookside Road, beyond which are semi-detached residential properties.

3.4.4 West

The site is bordered to the west by Brookside Road and further residential properties.

A selection of photographs is provided in Appendix A.

4.1 Current Site Use

The current property at 152-154 Uxbridge Road forms an end of terrace commercial/residential property with rear extension and service yard.

4.2 Potentially Contaminative Current Surrounding Land Use

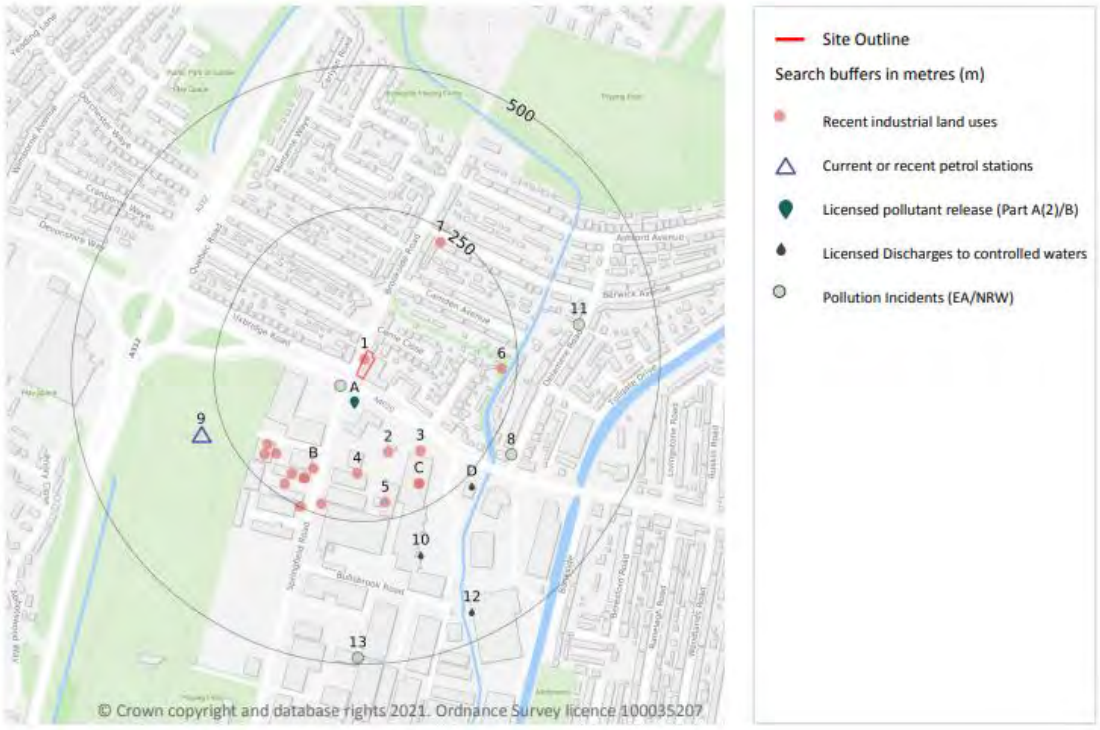


Table 1: Potentially Contaminative Current (and recent) Surrounding Land Use

Reference	Distance m	Company	Activity
1	Adjacent	UKPN	Electricity Substation
A	40m South	Kusum Service Station (no longer present)	Petrol Station
2	135m South	UKPN	Electricity Substation
5	220m South	Unspecified works	Industrial activity
B	240m South West	Panways, STS Distribution Ltd	Distribution and haulage operations

4.3 Petrol and Fuel Sites

There are no records of any current petrol and/or fuel sites within 500m of the site.

4.4 Underground HV Electricity Cables & High Pressure Gas Transmission Pipelines

There are no records of any such feature within 150m of the site.

4.5 Sites Determined as Contaminated Land

There are no records of any sites registered as potentially contaminated under Part2a of the Environmental Protection Act 1990 within 500m of the subject site.

4.6 Control of Major Accident Hazards

There are no records of any Control of Major Accident Hazards (COMAH) sites at or within 500m of the site.

4.7 Regulated Explosive Sites

There are no records of any sites registered and licensed by the HSE under the Manufacture and Storage of Explosives Regulations 2005 within 500m of the site.

4.8 Hazardous Substance Storage/Usage Sites

There are no records of any sites with consents issued under the Planning (Hazardous Substances) Regulations 2015 at or within 500m of the subject site.

4.9 Historical Licensed Industrial Activities

There are no records of any operators holding historical Integrated Pollution Control (IPC) permits within 500m of the site. This regime has now been superseded.

4.10 Licensed Industrial Activities

There are no records of Part A(1) installation sites at or within 500m of the site.

4.11 Licensed Pollutant Release

There is 1no. record of licensed pollutant releases from processes authorised under Part A(2)/B within a 500m radius of the site. This is associated with the unloading of petrol into storage at Kusum Service Station, 40m south of the site. Although this site is not recorded as a petrol and fuel site (section 4.3), it is evident that bulk fuel storage and venting of tanks to atmosphere during re-filling activity was undertaken. No enforcement activity associated with the operation of this permit was identified and the site has subsequently been subject to intrusive ground investigation (see section 5.5) and redevelopment.

4.12 Radioactive Substance Authorisations

There are no recorded permits relating to the storage, use, accumulation or disposal of radioactive substances within 250m of the site.

5.0 HISTORICAL LAND USES

5.1 Site Observational Evidence

152-154 Uxbridge Road forms a terraced property typical of those constructed during the early part of the twentieth century.

5.2 Historical Maps Assessment

A number of historical maps have been reviewed for the site and reviewed for potential evidence which may indicate potentially contaminative land uses for either the site or surrounding land within 250m of the site. Copies of the pertinent historical maps are provided in Appendix B and are discussed below:

Table 2: Historical Land Use

Map Year (Scale)	Site Use	Surrounding Land Use
1865 (1:2500)	Undeveloped open land.	The following notable features are observed: **East:** The site appears to be associated with Hayes Gate Farm, with the main buildings 120m from the site. **South:** The modern-day Uxbridge Road is referred to as High Road. **South East:** Wagon & Horses Public House evident 120m from the site.
1881 (1:10560)	No significant changes shown.	The following notable changes are observed: **South East:** A large area east of the Grand Union Canal marked as "Brick Field" extends to approximately 500m from the site.
1896 (1:2500)	No significant changes shown.	No significant changes shown.
1914 (1:2500)	No significant changes shown.	The following notable changes are observed: **South West:** Brookside Brick Works is now established and excavations and kilns are evident approximately 180m from the site. **South:** An apparent spoil heap and access track associated with the brick works is shown 200m from the site.
1935 (1:2500)	A small terrace of properties including 152-154 Uxbridge Road has now been constructed. The area to the rear appears to be a yard or garden.	The following notable changes are observed: **South West:** High Road has now been widened and renamed Uxbridge Road. Railway tracks linking the Brookside Brick Works to the Grand Union Canal are evident 275m from the site. **West:** A large drying shed and new kiln associated with Brookside Brick Works is shown 220m from the site. **North:** Brookside Road has been constructed and extensive residential development of the area is apparent.
1940 (1:2500)	No significant changes shown.	The following notable changes are observed: **North:** Residential development now abuts the site to the rear, with an unmarked structure shown adjacent

		to the site (in the present-day location of the electricity substation). **South West:** Springfield Road has now been constructed and a large factory manufacturing cardboard cases is present within 100m. **South East:** A large tyre factory is shown 200m from the site amidst a general industrialisation of the area south of Uxbridge Road.
1961 (1:1250)	No significant changes shown. A small structure is evident on the northern boundary of the site.	The following notable changes are observed: **South West:** Brookside Brick Works has closed down by this time. **South:** Further industrial development of the area with numerous works buildings and depots evident along Springfield Road. **West:** The large drying shed and associated infrastructure have been demolished and removed with the area shown as open land.
1973-74 (1:1250)	The property occupying the site has been extended to the rear.	The following notable changes are observed: **North:** The structure adjacent to the north is shown as an electricity substation. **South West:** The large cardboard works/factory is now shown as Academy House. **South:** The residential housing immediately across Uxbridge Road has been demolished and replaced with Hayes Gate House, with a garage and apparent canopy on the corner with Springfield Road.
1987 (1:1250)	No significant changes shown.	The following notable changes are observed: **South West:** Academy House has now been demolished and replaced with two large warehouse units corresponding to the present-day configuration of Springfield Road Retail Park.
1993 (1:1250)	No significant changes shown.	No significant changes shown.

The historical mapping shows that the subject site was developed from greenfield as part of a small terrace of properties in the first half of the twentieth century. This use has continued to the present day. Surrounding land use north of Uxbridge Road has been predominantly residential. The electrical substation adjacent to the north east corner of the site has been present since at least the early 1970's.

Potentially contaminative extractive industry (associated with Brookside Brickworks) and other industrial development of the area south of Uxbridge Road, including a garage facility at 27 Uxbridge Road, has been recorded.

5.3 Local Studies Information

Reference has been made to Grace's Guide to British Industrial History: 1914 Who's Who in Business.

EAST ACTON BRICK WORKS & ESTATES CO., Ltd. (THE), Brickmakers, Brookside Brickworks, Southall, Middlesex. Hours of Business: 6 a.m. to 6 p.m.; Saturdays, close at 1 p.m. Established in 1875. Incorporated as a Limited Company in 1888, formed by J. Crowle and G. Wright.

Present Directors: W. H. Rowse (Chairman), A. A. Rowse and R. M. Rowse. Business was transferred from East Acton to Southall in 1900. Premises: Cover about 120 acres. Staff: About 150. Specialities: Hand-made Bricks, Red Facings, Red Moulded Bricks and Building Stocks, &c. Connection: United Kingdom. Telephone: No. 64 Southall. Telegraphic Address: " Brookside Brickworks, Southall." Bankers: Barclay & Co., Ltd. (Southall).

Brookside Brick works. This 19th brick works was using brick earth from local sites. A tramway using locomotives ran from it to the canal side. This was evidenced by historical map of 1935.

5.4 Potentially Contaminative Historical Uses

The following records of potentially contaminative historical land uses within 100m of the site are shown.

There are a large number of potentially contaminative industrial operations recorded within 250m of the subject site (see Appendix B). These are primarily associated with the historical presence of the Brookside Brick Works and subsequent industrial development of the area south of Uxbridge Road. The following represent those that are considered to be of specific relevance to the site:

Table 3: Potentially Contaminative Historical Land Uses

Distance (m)	Direction	Activity	Date
40m	South	Garage	1974 - Present
50m	South west	Factory (cardboard cases) *then* Works	1940 – 1973
180m	South west	Drying shed associated with Brookside Brick Works	1935 – 1960
200m	South east	Tyre factory *then* Factory	1935 – 1994

5.4.1 Historical Tank Database

There are 6no. records of historical tanks within 250m of the property. The closest of these were at sites 50m north east of the site in 1914 and 130m south west of the site in 1940. No records relating to tanks on the subject site or within its immediate vicinity were evident.

5.4.2 Historical Energy Features Database

The following records of sites with historical energy features are known within 250m of the property.

Table 4: Historical Energy Features

Distance (m)	Direction	Activity	Date
Adjacent	North east	Electrical Substation	Pre-1974 - Present
190m	South west	Electrical Substation	Pre-1974 - Present
240m	South west	Electrical Substation	Pre-1974 - Present

5.4.3 Historical Petrol and Fuel Sites

There are no records of any historical petrol and/or fuel sites within 250m of the property.

5.4.4 Historical Garage and Motor Vehicle Sites

The following records of historical garage and motor vehicle sites are known within 500m of the property.

Table 5: Historical Garage and Motor Vehicle Sites

Distance (m)	Direction	Activity	Date
40m	South	Garage	Pre-1974 - 2012

5.5 London Borough of Hillingdon Planning Record

Reference has been made to relevant historical information contained on the planning record. Three planning applications relating to advertising hoardings, internally illuminated signs and alterations to the shopfront and internal areas were recorded for 152 Uxbridge Road. These are not considered to be of significant environmental concern.

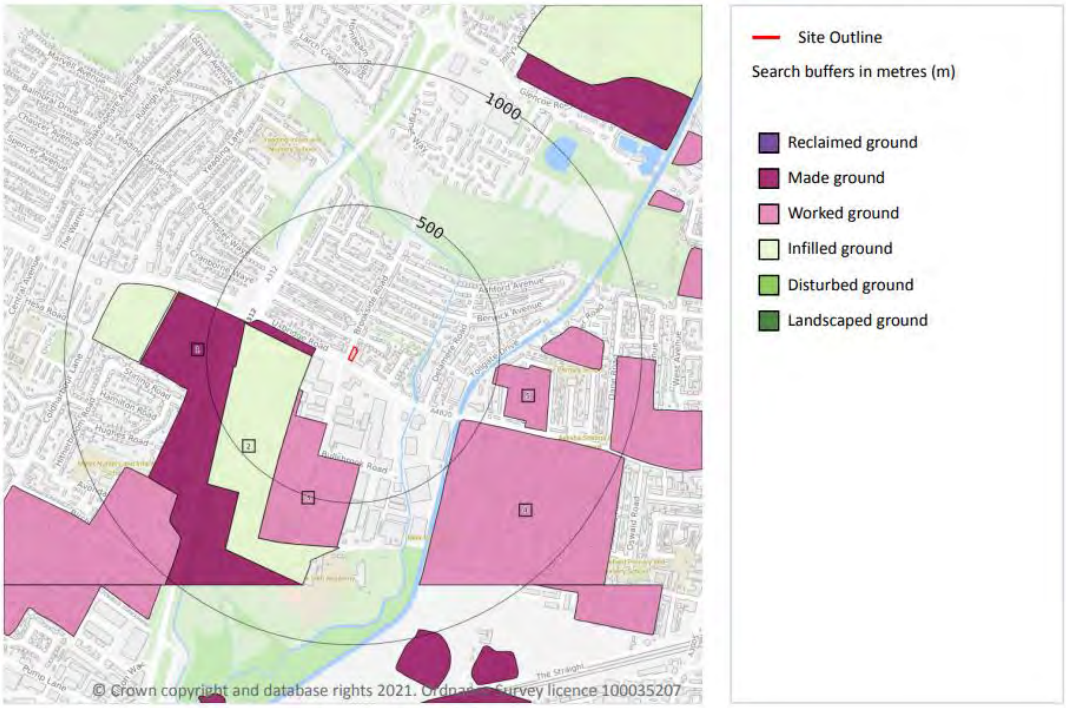
Planning applications relating to sites in the vicinity were also reviewed. Springfield Retail Park which originally contained Wickes and MFI was redeveloped in the early 1980's.

The site immediately across Uxbridge Road (27 Uxbridge Road) was subject to geo-environmental site investigation in October 2012 (Constructive Evaluation Limited: Stage 2: Site Investigation at Heathrow Gate, 27 Uxbridge Road – ref. 12.7302). This involved the progression of 3no. boreholes, the excavation of 4no. trial pits and subsequent soil, groundwater and ground gas analysis. No soil-, water- or air-borne contamination was identified at that time., with the overall risk considered to be negligible to low.

6.0 GEOLOGY

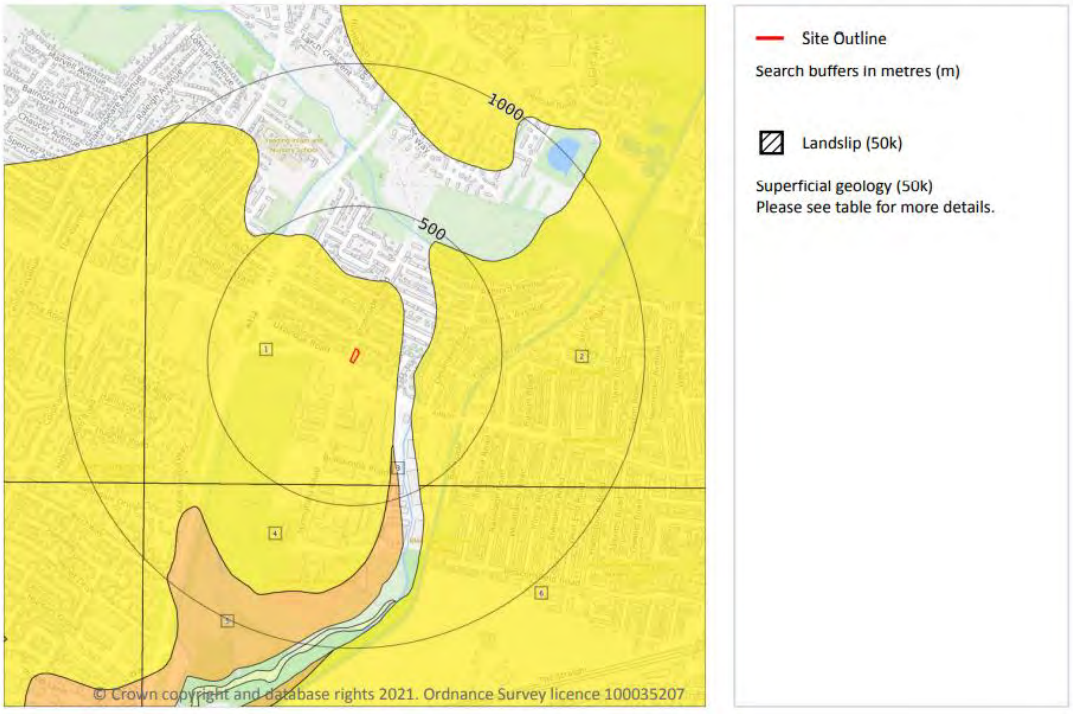
6.1 Artificial and Made Ground

There are no records of artificial and/or made ground shown at the site itself. Made Ground is recorded 120m west of the subject site and infilled ground is associated with the former Brookside Brick Works.



6.2 Superficial and Drift Geology

The British Geological Survey 1:50,000 Geological Map of Great Britain shows the presence of superficial clay and silt strata of the Langley Silt Member. These superficial deposits have a very low to low permeability.



6.3 Solid Geology

The British Geological Survey 1:50,000 Geological Map of Great Britain shows the solid geology beneath the site is the London Clay Formation, consisting of clay, silt and sand. The bedrock has a very low to moderate permeability from intergranular flow.

A BGS Borehole Record progressed 80m south of the site in 1961 recorded approximately 0.8m depth of Made Ground over 1m of firm brown sandy clay and stones which lay over 3m of gravel and sand. This was further underlain by approximately 2m depth of silty clay layers with the London Clay encountered at approximately 7mbgl. Groundwater seepage was encountered just above the London Clay.

6.4 Mining

Information provided by the Coal Authority indicates that the site lies does not lie in proximity to a coal mining reporting area. There are no records of any underground workings within 1000m of the site.

6.5 Non-coal Mining

Historical surface ground workings have been identified in the site's vicinity from historical mineral planning permissions and BritPits database and historical Ordnance Survey maps of the area. These workings are all associated with the Brookside Brick Works which occupied the area across Uxbridge Road to the south west from the early twentieth century.

6.6 Brine Affected Areas

There are no brine affected areas within 100m of the site.

6.7 Shrink Swell

The maximum shrink swell hazard for the site has been rated by the BGS as very low, with ground conditions predominantly of low plasticity.

6.8 Landslip/Slide

The risk associated with slope instability issues at the site is considered to be very low.

6.9 Soluble Rocks

There is a negligible risk from soluble rocks at the site. Soluble rocks are not thought to be present beneath the site.

6.10 Compressible Ground

The maximum compressible ground hazard for the site has been rated by the BGS as negligible. Compressibility and uneven settlement hazards are unlikely to be present.

6.11 Collapsible Rocks

The maximum collapsible rocks hazard for the site has been rated by the BGS as low.

6.12 Running Sand

There is a negligible potential for running sand problems, with such conditions not thought to occur whatever the position of the water table. No identified constraints to land use have been identified.

6.13 Radon

The Indicative Atlas of Radon in England and Wales as prepared by both the Health Protection Agency and the British Geological Survey shows that the site is not located in a radon area as less than 1% of properties are above the Action Level. No radon protection measures are necessary.

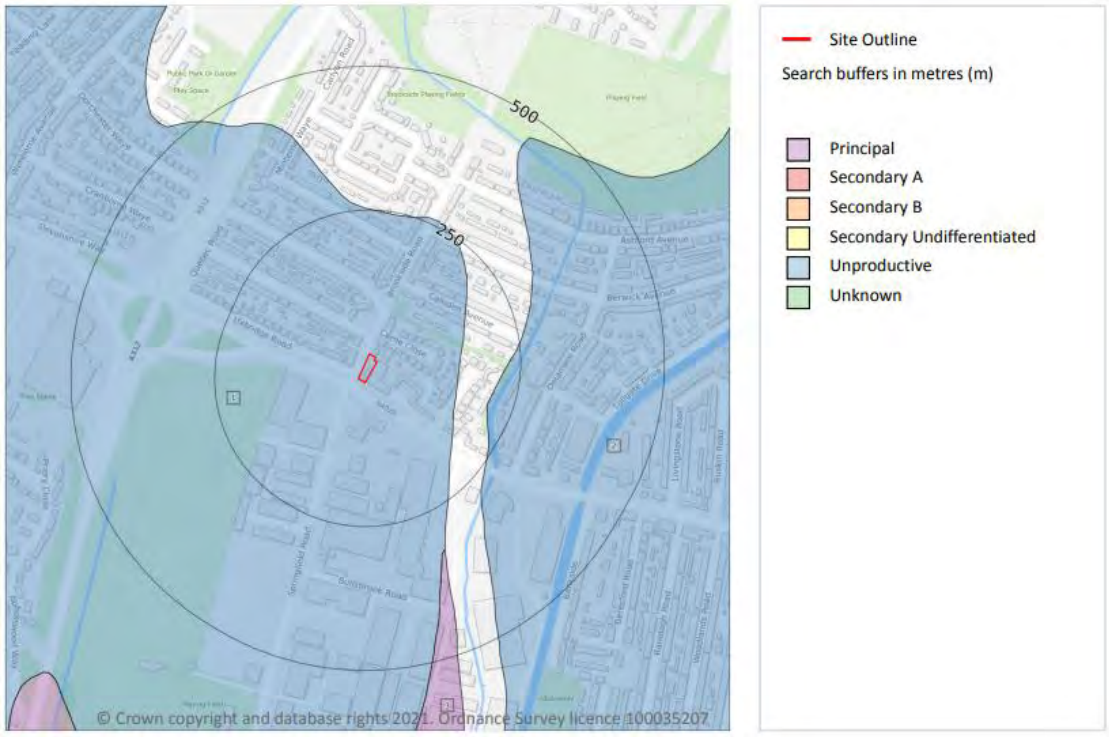
6.14 Background Soil Chemistry

It is recorded by the BGS that on site there is the potential for the following natural contaminants to be present: arsenic 17mg/kg, lead 208mg/kg, cadmium 0.8mg/kg, chromium 101mg/kg, nickel 38mg/kg.

7.0 HYDROGEOLOGY

7.1 Groundwater Vulnerability and Soil Classification

The site is located on superficial Langley Silt deposits which, in common with the London Clay strata beneath, are classified as unproductive. These are rock layers and drift deposits with low permeability that have negligible significance for water supply or base flow to rivers. The strata are unproductive so do not have a permeability classification.



7.2 Groundwater Abstraction Licences

There are no active groundwater abstraction licences issued within 2000m of the site. Two historical licences are recorded at Apexes Works, approximately 1400m south of the site. These were held for evaporative cooling purposes and commenced in the mid 1960's. The other licences were held by Nestle at its coffee factory 1900m south west of the site.

7.3 Licensed Discharges to Controlled Waters

There are no records of any currently licensed discharges to controlled waters within 250m of the site. The closest active discharge is 450m south east of the site at Bullsbrook Road for the miscellaneous discharge of surface water into the River Crane.

7.4 Pollutant Release to Surface Waters (Red List)

There are no records of any licenses issued to sites at or within 500m of the site for a pollutant release to a surface water (Red List).

7.5 Pollutant Release to a Public Sewer

There are no records of any licenses issued to sites at or within 500m of the site for a discharge of special category effluent to the public sewer.

7.6 List 1 and List 2 Dangerous Substances

There are no records of any discharges of dangerous substances as identified on List 1 and List 2 of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015 within 500m of the site.

7.7 Pollution Incidents

There are 4no. records of pollution incidents for sites within 500m of the property. The closest of these occurred in 2001 and involved the release of contaminated water at a site 30m south west of the subject site. A Category 3 (minor) impact was recorded and is considered unlikely to have significantly affected the subject site. Other incidents occurred in 2003, are over 250m from the subject site and considered unlikely to have affected the subject site.

7.8 Pollution Inventory Substances

There are no records of any pollution inventory (substances) including reporting on annual emission of certain regulated substances to air, controlled waters and land at or within 500m of the site.

7.9 Pollution Inventory Waste Transfers

There are no records of pollution inventory (waste transfers) including includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given.

7.10 Pollution Inventory Radioactive Waste

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from sites. There are no such records within 500m of the site.

7.11 Source Protection Zones

There are no source protection zones within 500m of the site.

8.0 HYDROLOGY

8.1 Surface Waters

The closest surface watercourse to the site is the Yeading Brook which runs in a southerly direction, approximately 220m east of the site. The Grand Union Canal (Paddington Branch) lies a further 200m east.

The Yeading Brook joins up with the River Crane just south of Minet Country Park and eventually joins the River Thames at Isleworth, 7.5km south east of the subject site.

8.2 Surface Water Abstraction Licences

There are no active surface water abstraction licenses recorded for sites within 2,000m of the site.

8.3 Potable Water Abstraction Licences

There are no active potable water abstraction licenses recorded for sites within 2,000m of the site.

8.4 Flooding

8.4.1 Risk of Flooding from Rivers and Seas (RoFRaS)

The Environment Agency identify areas of land at risk of flooding, when the presence of flood defences are ignored. The river and coastal flooding maps show that the site is not located within an identified flood risk area.

8.4.2 Historical Flood Events

There is 1no. record of an historical flooding event within 250m of the site. This record relates to an incident of local drainage / surface water flooding in 1977, approximately 200m east of the subject site.

8.4.3 Surface Water Flooding

There is reported to be a 1 in 100 year likelihood of surface water flooding between 0.1 – 0.3m at the site.

8.4.4 Groundwater Flooding

There is a low risk of groundwater flooding at the site.

8.4.5 Flood Defences

There are no records of areas benefitting from flood defences within 250m of the subject site. Similarly, there are reportedly no areas that act as flood storage within 250m of the site.

9.0 WASTE

9.1 Landfill Sites

There are no records of active or recently closed landfill sites subject to Environment Agency regulation within 500m of the site.

London Borough of Hillingdon and Environment Agency historical records reveal the previous presence of the Minet Landfill 120m west of the site. This site was reportedly active between May 1986 and July 1989, with Wimpey Construction UK Ltd recorded as the licence holder depositing exclusively inert materials in the former brickwork excavations.

9.2 Waste Sites

There is 1no. licensed waste site under Environment Agency regulation within 500m of the subject site. This licence is held by Southern Electric at Hayes Depot (140m south of the site) for the storage of electrical insulating oils. There are a further 2no. records of active or recently closed licensed waste sites within 500m of the subject site, as identified in Local authority planning records. These both relate to an absorbent hygiene product recycling facility 300m south east of the subject site on the opposite side of Yeading Brook.

There are no records within 500m of the site where a waste exception is in place.

9.3 Pollution Inventory Substances

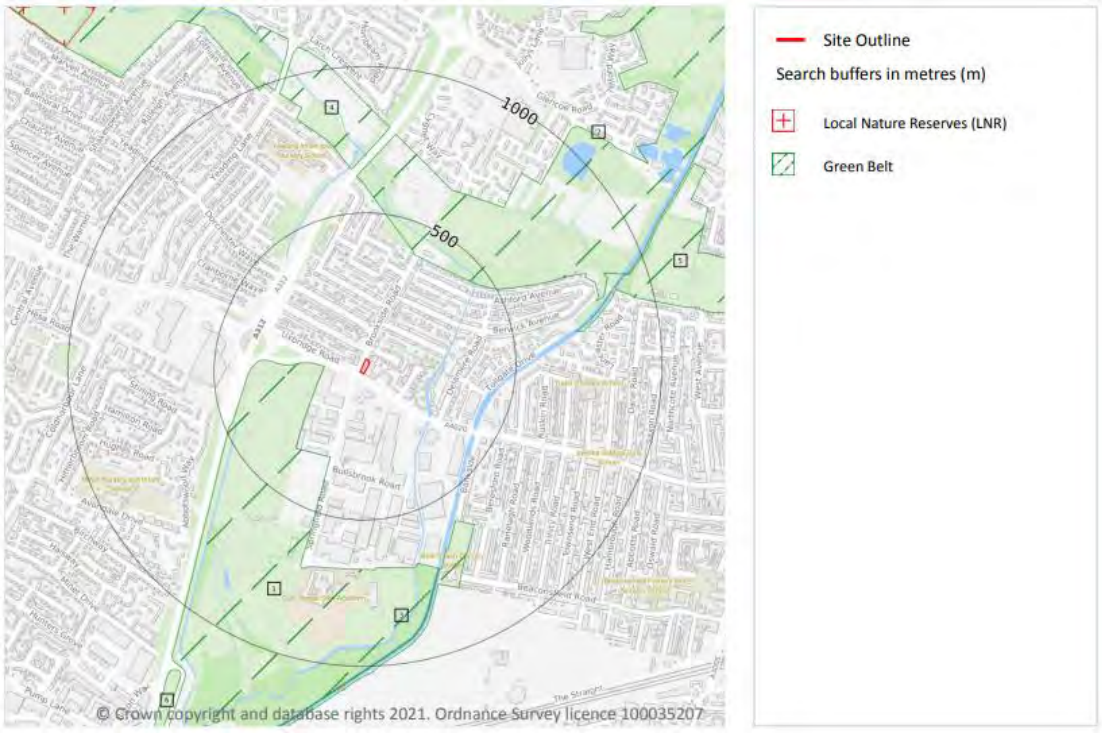
There are no records of any substances recorded on the pollution inventory for any site at or within 500m of the site.

9.4 Pollution Inventory Radioactive Waste

There are no records of any radioactive substances recorded for any site at or within 500m of the site.

10.0 DESIGNATED ENVIRONMENTALLY SENSITIVE SITES

In assessing the location of any Designated Environmentally Sensitive Sites the Local Plan has been consulted (online) as well as other electronic databases (www.magic.co.uk). The following designated environmentally sensitive sites are located within 250m of the sites:



10.1 Nationally Designated Sites

There are no designated Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), National Nature Reserves (NNR) or similarly designated sites within 2000m of the subject site.

10.2 Local Nature Reserves

Ten Acres Wood and Meadows (part of Yeading Woods LNR) is located 1500m north west of the subject site.

10.3 Other Ecological Receptors (Source Magic / DEFRA)

Minet Country Park (120m west of the site) is a 36 hectare park featuring a playground, visitor centre and ponds. The site was acquired by the London Borough of Hillingdon in the mid 1960's from the Minet family who had owned the site as part of the Coldharbour Estate from at least 1766.

10.4 Cultural Designations

There are no records of listed buildings, conservation areas of other designated features of cultural interest within the site's vicinity.

11.0 CONCEPTUAL SITE MODEL

The model assessment has been made on the understanding that the site is used for <u>Residential Purposes</u>. Those potential pathways which may give rise to unacceptable contaminative risk under this scheme have been brought forward and form part of the Model as discussed below.

Table 6: Conceptual Site Model

Consideration of Potential Contaminants:	
On-Site Contaminants	▪ No significant on-site contamination sources associated with the site's history have been identified. Similarly, no obvious current evidence of contamination was noted. ▪ Made Ground beneath the yard area is considered unlikely to contain significant contaminative material.
Off-Site Contaminants	▪ The adjacent electrical substation has been present since at least the early 1970's but all electrical infrastructure is housed in a red, fully-enclosed brick-built structure, with no obvious evidence of significant contamination noted. ▪ The general vicinity of the site has been exposed to potentially contaminative extractive industry associated with Brookside Brickworks. ▪ The site of the former Minet Landfill, which was operational in the late 1980's is located 120m west of the site, but records indicate that it received inert waste materials only. Underlying superficial ground conditions are of low permeability and previous site investigations at development sites in the immediate vicinity have recorded no elevated ground gas levels. ▪ A former garage immediately across Uxbridge Road was subject to site investigation prior to its redevelopment in the 2012 to support a hotel use and was assessed as negligible to low risk.

Consideration of Potential Receptors:	
Controlled Waters	▪ The underlying superficial and bedrock strata are non-productive. ▪ The Yeading Brook flows approximately 200m east of the site, but the superficial Langley Silt is of very low to low permeability.
Human Health	▪ Future residential site occupiers but most areas will be hard landscaped and imported topsoil will be used in amenity areas. ▪ Construction workers primarily those involved in groundworks excavation. ▪ Neighbouring residents subject to disturbed vapours and dusts arising from on-site development.
Other	▪ Existing and new underground service infrastructure. ▪ Faunal visitors to the site in the future

Potential contaminant pathways and pollutant linkages:	
On-Site Contaminants	▪ No significant pollutant linkages have been identified.
Off-Site Contaminants	▪ No significant pollutant linkages associated with off-site sources of contamination have been identified.

Other Considerations:	
Geotechnical foundation design	▪ Foundations for the new residential buildings will need to be founded on competent strata.
Waste acceptance criteria	▪ Surplus spoil excavated from the site will need to be classified (WAC tested) prior to off-site disposal.
Percolation Testing	▪ Future percolation testing to confirm infiltration rates for surface water drainage form the site would be beneficial.

12.0 PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT

12.1 Introduction

The current contaminated land regime is explained in Part IIA of the Environmental Protection Act 1990 and was introduced on the 1st April 2000 in England. Also, this assessment has been completed taking into account the advice and guidance contained in the NPPF and particularly paragraphs 109 (fourth and fifth bullet points) and the new LCRM regulations which is the latest guidelines issued by Government Environment Agency Published on 08/10/2020. In general, the purpose of these aspects of the legislation is to achieve the identification of contaminated land and the remediation of contaminated land to ensure the such land poses no significant risk to human health and/or the environment.

Contaminated Land is defined as:

'*any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason or substances in, on, or under the land, that: significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled water is being or is likely to be caused.'*

For land to be classified as contaminated land a relevant Pollutant Linkage must be identified. A Pollutant Linkage will only be present where the Source-Pathway-Receptor factors are all present and where they are not all present, no risk assessment is possible.

Statutory Definitions	
Contaminant Source (Hazard)	A substance which is in, on or under the land and which has the potential to cause harm or cause pollution of controlled waters
Receptor (Target)	A living organism or group of organisms, an ecological system or property, controlled waters which are or could be polluted by a contaminant
Pathway (Route)	One or more routes or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused.

A Preliminary Environmental Risk Assessment involves assessing the likely probability and consequence of a Pollutant Linkage and determining a consequent level of risk.

The term 'risk' is widely used in different contexts and situation but a prescriptive definition is provided by the Guidelines for Environmental Risk Assessment and Management (DEFRA et al, 2000):

Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequence of the occurrence'.

A hazard is defined as '*a property or situation that in particular circumstance could lead to harm'*.

The risk category for a particular scenario can be assessed in terms of the consequences and probability of an occurrence which can be defined as follows (Ref: CIRIA C552):

Classification of a Consequence

Classification	Definition
Severe	1 – short term (acute) risk to human health likely to result in significant harm 2 – short term risk to controlled waters 3 – catastrophic damage to buildings / structures 4 – short term risk to an ecosystem or organism within the particular ecosystem.
Medium	1 – chromic damage to human health (long term risk) 2 – pollution of a sensitive water resource 3 – a significant change in an ecosystem or organism within the ecosystem
Mild	1 – pollution of non-sensitive water resources 2 – significant damage to buildings / structures
Minor	1 – harm (not necessarily significant) which may result in financial loss; 2 – non permanent health effects to humans (easily prevented by PPE for example) 3 – easily repairable effects of structural (building damage).

Classification of a Probability

Classification	Definition
High Likelihood	1 – there is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term 2 – evidence of harm to the receptor
Likely	1 – there is a complete pollution linkage which means that it is probable that an event will occur 2 – the event is not inevitable but possible in the short term and likely in the long term
Low Likelihood	1 – there is a complete pollution linkage and circumstance are possible under which an event could occur 2 – it is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Unlikely	1 – there is a complete pollution linkage but circumstance are such that is improbable that an event would occur even in the long term.

The consequences of a risk and the probability of an event taking place can be assessed and the likely risk category can be determined as follows:

		Consequence			
		Severe	***Medium***	***Mild***	***Minor***
Probability	**High**	**Very High**	**High**	**Medium**	**Medium / Low**
	Likely	**High**	**Medium**	**Medium / Low**	**Low**
	Low	**Medium**	**Medium / Low**	**Low**	**Very Low**
	Unlikely	**Medium / Low**	**Low**	**Very Low**	**Very Low**

High Risk – there is a high probability that severe harm could risk a receptor, or there is evidence that a receptor is being harmed. The risk is realised is likely to result in liability and/or significant harm, and urgent investigation or remediation will be required.

Medium Risk - it is probable that harm will arise to a receptor. However it is relatively unlikely that such harm would be severe, or if harm does occur then the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk – it is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Very Low Risk – There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

12.2 Potential Sources

The current and historical use of the site and its surroundings has been carefully assessed. All potential risks have been determined and assessed as part of this study.

The risk of contaminant source material located on site is low. The site appears to have only been used for residential, retail and ancillary parking purposes since its development from greenfield in the early twentieth century. Natural levels of contamination are expected from records (BGS) to be very low. No solid or liquid contaminative sources are expected historically.

A number of off-site sources are also recorded in the vicinity of the site, including the adjacent electricity substation, industrial works south of Uxbridge Road and the historical presence of Brookside Brickworks.

12.3 Potential Pathways

Exposure pathways link any contamination to the receptor. All or any of the following potential pathways may apply:

<u>Future Site Workers, including Construction Workers</u>

Oral Pathway (W-O)	Indoor /outdoor ingestion of dust
	Indoor/outdoor ingestion of soil
	Indoor/outdoor ingestion of Flora/Fauna
	Ingestion of tainted mains water
Inhalation Pathway (W-I)	Indoor/outdoor inhalation of fugitive dust
	Indoor/outdoor inhalation of soil vapour
Dermal Pathway (W-D)	Indoor/Outdoor exposure to soil through dermal contact

<u>Future Site Users, Occasional Visitors and Neighbouring Residents including Children</u>

Oral Pathway (O-O)	Indoor ingestion of dust (post construction)
	Outdoor ingestion of soil (post construction)
	Indoor/outdoor ingestion of Flora/Fauna
Inhalation Pathway (O-I)	Outdoor inhalation of fugitive dust
	Indoor inhalation of fugitive dust (post construction)
	Outdoor inhalation of soil vapour
	Indoor inhalation of soil vapour (post construction)
Dermal Pathway (O-D)	Outdoor exposure to soil through dermal contact
	Indoor exposure to soil dust through dermal contact

<u>Flora (potential new on-site or off-site flora affected by potential contamination on the site, or migrating onto or from the site).</u>

Plant Uptake (Fl-PU)	General uptake of contaminants by plants growing in the vicinity of, or on, the site

Fauna (on-site or off-site affected by potential contamination on the site, or migrating from the site)

Oral Pathway (Fa-OP)	Consumption of contaminated Flora located on site

Water Resources

Surface Water Mobilisation (SWM)	Surface water run-off from site, migrating off site Also infiltration into the site from site.

Groundwater Mobilisation (Leaching Potential) (GWM)	Percolation and mobilisation of contaminants within the soil into waters held locally within pore space beneath the site.

12.4 Potential Receptors

The following potential receptors have been identified for the site:

Human Receptors (H)	Site workers (W), child/adult future site users (H), neighbours (N),
Flora and Fauna (FL, FA)	Future, on and off-site Fauna and Flora
Water Resources (SW, GW)	Unproductive superficial aquifer, unproductive bedrock aquifer
Site Infrastructure (SI)	Existing and future foundations and drainage services
Ecological Designations (E):	Site vegetation
Buildings and Services (BS):	Site and neighbouring buildings
Archaeological (A):	Designations in vicinity of the site if applicable
Cultural (C):	Designations in vicinity of the site if applicable

Under the proposals the site is to be developed for residential purposes. The Critical Human Receptor for this site will be a **young female child who may reside at the site.**

12.5 Qualitative Risk Assessment

A qualitative risk assessment has been undertaken to provide an initial assessment of the potential risks caused by contaminant sources identified during this assessment to construction workers, future users of the site, building structures and the aquatic environment. **The assessment has been made on the understanding that the site is used for long term residential use.**

Table 7: Risk Assessment

Hazard Identification			Hazard Assessment		Risk Estimation			Risk Evaluation
Sources	**Location**	**Potential Contaminants**	**Pathway**	**Receptor**	**Magnitude of Consequence**	**Probability Occurrence**	**Risk Appraisal**	**Rationale**
Historical and current use of the site Residential, retail and parking use	On site	Made Ground	W-O, W-I, W-D, O-O, O-I, O-D, FLPU, FaOP SWM	H, SW, FL, FA	Mild	Low	Low	- Historical evidence highlights exclusive residential and retail use of site - No significantly contaminative source associated with recent use - No obvious potentially contaminative historical uses of the site - **No further assessment required.**
Historical use of surrounding land Electrical Substation	Adjacent to north east	Inorganic and organic contaminants (metals, hydrocarbons, solvents)	W-O, W-I, W-D, O-O, O-I, O-D, FLPU, FaOP SWM	H, SW, FL, FA	Mild	Low	Low	- Long-term presence of adjacent electrical substation (since at least the early 1970's) - All electrical infrastructure housed and contained in a red, fully-enclosed brick-built structure - No obvious evidence of significant contamination noted. - **No further assessment required.**
Historical use of surrounding land Brookside Brickworks and then filling	120m south west	Ground gas	W-I, O-I	H, BS	Minor	Low	Very Low	- Exclusively inert nature of fill materials identified in one recorded landfill location (Minet Landfill) - Underlying superficial ground conditions are of low permeability - Previous site investigations at development sites in the immediate vicinity have recorded no elevated ground gas levels. - **No further assessment required.**
Historical use of surrounding land Garage	40m south	Organic contaminants (hydrocarbons, solvents)	W-I, O-I, GWM	H, GW, SI, BS	Minor	Unlikely	Very Low	- Current hotel use (Hyatt Place). - Intrusive site investigation completed prior to the garage redevelopment in 2012 - No soil-, water- or air-borne contamination identified. - Following SI, risk assessed as negligible to low risk. - **No further assessment required.**

13.0 CONCLUSIONS AND RECOMMENDATIONS

13.1 Conclusions

The site currently supports an end of terrace property, with a retail shop at ground floor level, residential accommodation above and a rear yard area, used for access, storage and miscellaneous parking purposes. No obvious evidence of significant contamination or other significant environmental concern was noted during the site reconnaissance.

The historical mapping shows that the subject site was developed from greenfield as part of a small terrace of properties in the first half of the twentieth century. This use has continued to the present day. Surrounding land use north of Uxbridge Road has been predominantly residential.

The electrical substation adjacent to the north east corner of the site has been present since at least the early 1970's. However, all electrical infrastructure is housed and contained in a red, fully-enclosed brick-built structure that would limit the unforeseen release of potentially contaminative materials (especially oils) into the subsurface.

Potentially contaminative extractive industry (associated with Brookside Brickworks) and other industrial development of the area south of Uxbridge Road has been recorded. Further to this activity, the Minet Landfill (120m west of the site) was recorded to have received inert waste materials during the late 1980's. Notwithstanding this, underlying superficial ground conditions are of low permeability and previous site investigations at development sites in the immediate vicinity have recorded no elevated ground gas levels.

A motor vehicle garage, incorporating bulk fuel storage facilities, was historically located immediately across Uxbridge Road at Number 27. Intrusive investigation of this site was completed in 2012 prior to the garage redevelopment to a hotel use. No soil-, water- or air-borne contamination was identified.

The underlying ground conditions comprise low permeability Langley Silt. The setting of the site is considered to be of low to moderate environmental sensitivity due to the non-productive nature of the underlying strata, the distance to surface water courses and the residential nature of the proposed development and its surroundings.

The conceptual model of the site demonstrates that potential pollutant linkages are generally of a very low to low risk to human health and to the natural environment during both the construction and post-construction phases of the redevelopment project.

Based on the available information, no significant contamination concerns to impact the proposed development of the site have been identified. No significant pollutant pathways, linking on- or off-site contaminant sources to potential receptors, have been identified.

13.2 Recommendations

No further investigation of the site is considered necessary at this stage. The report is based on the assumption by the author that should instances of previously unreported contamination be found during the proposed works, then appropriate assessment of the risks and proposed remediation scheme will be required.

The report is supplied subject to our standard terms and conditions and these should be read alongside the report.

FIGURES

FIGURE 1

SITE LOCATION PLAN
SMALL SCALE

152-154 UXBRIDGE ROAD
LONDON
UB4 0JH

FIGURE 2

SITE PLAN
LARGE SCALE

152-154 UXBRIDGE ROAD
LONDON
UB4 0JH

FIGURE 3

SITE AERIAL PHOTOGRAPH

152-154 UXBRIDGE ROAD
LONDON
UB4 0JH

FIGURE 4
PROPOSED SITE LAYOUT PLAN

152-154 UXBRIDGE ROAD
LONDON
UB4 0JH

APPENDICES

APPENDIX A

SITE PHOTOGRAPHS

Photograph 1: View of site from Uxbridge Road

Photograph 2: View to front of 152-154 Uxbridge Road

Photograph 3: View of side of property showing gas cylinder storage

Photograph 4: View of access area to rear of advertising hoarding

Photograph 5: View to rear of site from rear access road off Brookside Road

Photograph 6: View of rear yard area showing electricity substation

Photograph 7: View of shop service entrance and yard area

Photograph 8: View to rear of shop extension

Photograph 9: View of electricity substation showing enclosed brick structure

Photograph 10: View of internal rear shop area

APPENDIX J -

CHEMICAL GACs

RESIDENTIAL WITH HOMEGROWN PRODUCE (RwHP) - SOM 1%							
Determinand	Unit	GAC	Concentration			Number of Tests	Number of Exceedences
			Investigation by Geofirma				
			WS3 0.6 m	BH1 1.3 m	SA2 0.3 m		
Metals							
Arsenic (aqua regia extractable)	mg/kg	32.0	28.0	26.0	13.0	3	0
Cadmium (aqua regia extractable)	mg/kg	10.0	< 0.2	< 0.2	< 0.2	3	0
Chromium (hexavalent)	mg/kg	4.3	< 1.8	< 1.8	< 1.8	3	0
Chromium (aqua regia extractable)	mg/kg	627.0	57.0	46.0	39.0	3	0
Copper (aqua regia extractable)	mg/kg	2330.0	29.0	25.0	20.0	3	0
Lead (aqua regia extractable)	mg/kg	200.0	18.0	16.0	42.0	3	0
Mercury (aqua regia extractable)	mg/kg	40.0	< 0.3	< 0.3	< 0.3	3	0
Nickel (aqua regia extractable)	mg/kg	130.0	35.0	33.0	21.0	3	0
Zinc (aqua regia extractable)	mg/kg	3700.0	68.0	77.0	88.0	3	0
Inorganics							
Total Cyanide	mg/kg	4.6	< 1.0	< 1.0	< 1.0	3	0
Miscellaneous							
Stones Content	%	-	< 0.1	< 0.1	< 0.1	3	-
Moisture Content	%	-	17.0	13.0	17.0	3	-
Phenols							
Total Monohydric Phenols	mg/kg	280.0	< 0.80	22.2	18.5	3	0
Polyaromatic hydrocarbons							
Naphthalene	mg/kg	1.50	< 0.05	0.06	< 0.05	3	0
Acenaphthylene	mg/kg	170.0	< 0.05	< 0.05	< 0.05	3	0
Acenaphthene	mg/kg	210.0	< 0.05	0.43	0.28	3	0
Fluorene	mg/kg	160.0	< 0.05	0.54	0.34	3	0
Phenanthrene	mg/kg	92.0	< 0.05	3.6	2.3	3	0
Anthracene	mg/kg	2300.0	< 0.05	0.52	0.48	3	0
Fluoranthene	mg/kg	260.0	< 0.05	4.6	3.9	3	0
Pyrene	mg/kg	560.0	< 0.05	3.8	3.2	3	0
Benzo(a)anthracene	mg/kg	3.1	< 0.05	1.4	1.4	3	0
Chrysene	mg/kg	6	< 0.05	1.7	1.6	3	0
Benzo(b)fluoranthene	mg/kg	2.6	< 0.05	2	1.6	3	0
Benzo(k)fluoranthene	mg/kg	8.5	< 0.05	0.6	0.79	3	0
Benzo(a)pyrene	mg/kg	2.20	< 0.05	1.5	1.5	3	0
Indeno(1,2,3-cd)pyrene	mg/kg	3.2	< 0.05	0.68	0.64	3	0
Dibenz(a,h)anthracene	mg/kg	0.24	< 0.05	0.11	< 0.05	3	0
Benzo(ghi)perylene	mg/kg	44	< 0.05	0.79	0.72	3	0
Total TPH C10 - C40							
>C10-C40	mg/kg	-	170.0	< 10	400.0	3	-
VOCs							
MTBE	µg/kg	-	< 5.0	< 5.0	< 5.0	3	0
Benzene	µg/kg	0.087	< 5.0	< 5.0	< 5.0	3	0
Toluene	µg/kg	130	< 5.0	< 5.0	< 5.0	3	0
Ethylbenzene	µg/kg	47	< 5.0	< 5.0	< 5.0	3	0
p & m-Xylene	µg/kg	56	< 8.0	< 8.0	< 8.0	3	0
o-Xylene	µg/kg	60	< 5.0	< 5.0	< 5.0	3	0
Asbestos							
Asbestos in Soil Detected/Not Detected	mg/kg		Not-detected	Not-detected	Not-detected	9	-
Classification	mg/kg		-	-	-	9	-
Asbestos % by hand picking/weighing	%		-	-	-	9	5

Geofirma

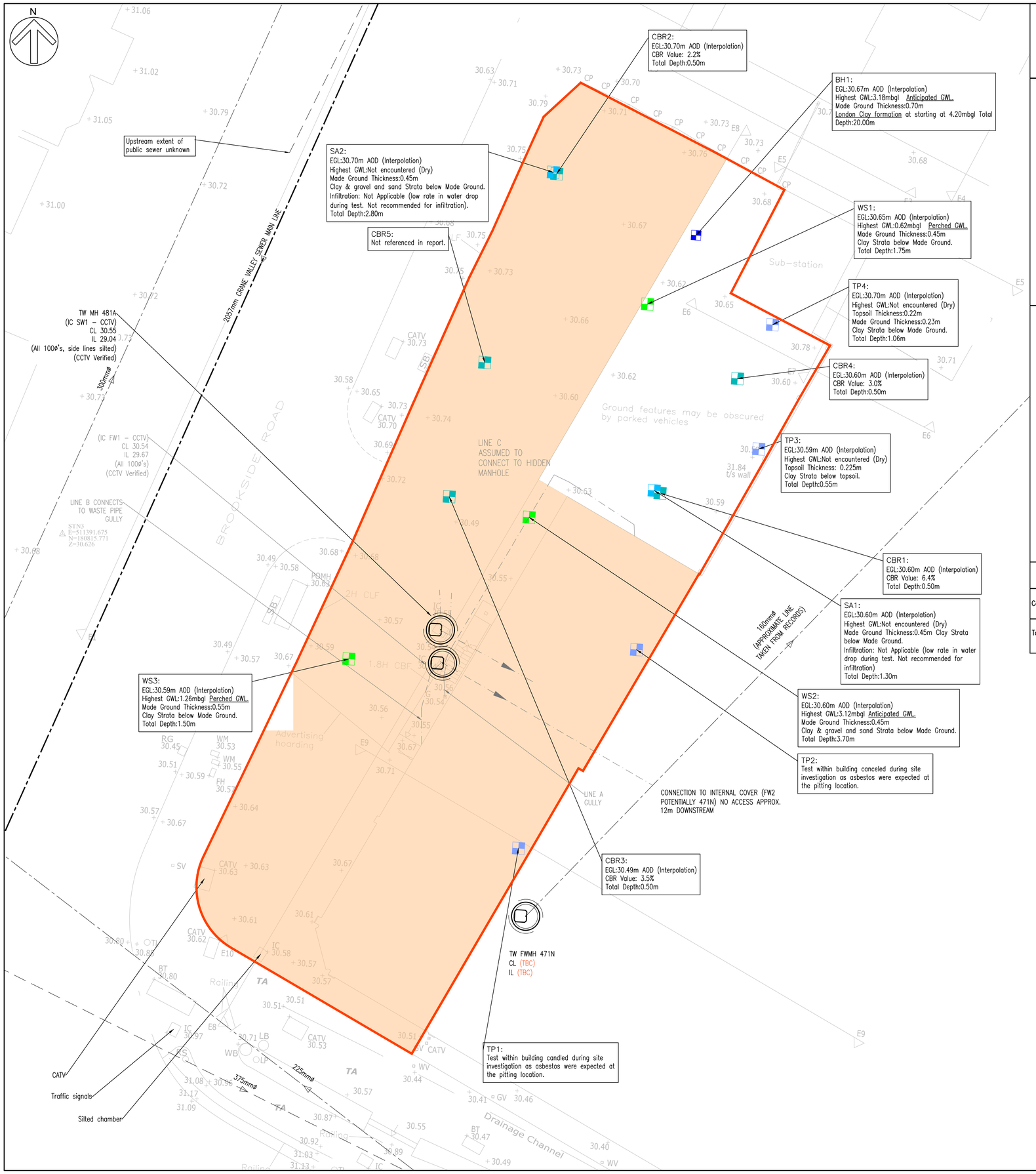
Cardinal Point

Park Road

Rickmansworth

WD3 1RE

Appendix B – Drainage Drawings and Calculations



GENERAL LEGEND:

Total red line boundary (0.070 ha)

EXISTING DRAINAGE LEGEND

- FWMH — Existing Thames Water Foul Water Drainage. (Drainage information as taken from Thames Water asset mapping) (Extents, depth, condition and size to be confirmed onsite via CCTV survey)
- SWMH — Existing Thames Water Surface Water Drainage. (Drainage information as taken from Thames Water asset mapping) (Extents, depth, condition and size to be confirmed onsite via CCTV survey)
- FWMH — Existing Private Foul Water Drainage.
- SWMH — Existing Private Surface Water Drainage.

PRIVATE GROUND INVESTIGATION LEGEND:

- Approximate Location of CBR Pit
- Approximate Location of Soakaway Pit
- Approximate Location of Foundation Inspection Pit (Trail Pit)
- Approximate Location of Window Sample Borehole
- Approximate Location of Cable Percussion Borehole

Results as shown herein as taken from Geofirma LTD. Ground Investigation Interpretative Report, Report No.: 2024-065-PRE-UXB_REP001_REV00, Dated 11/03/2025.

EXISTING HARDSTANDING PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
Total Catchment Area	0.056 ha	Assumed to existing surface water sewer.

DO NOT SCALE

GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
8. This drawing should not be used for setting out
9. All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD
P1	14-07-2025	YP	PLANNING CONDITION DISCHARGE	YP	DM

DRAWING STATUS: FOR PLANNING

CIVILISTIX
Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: JP & S Services Ltd

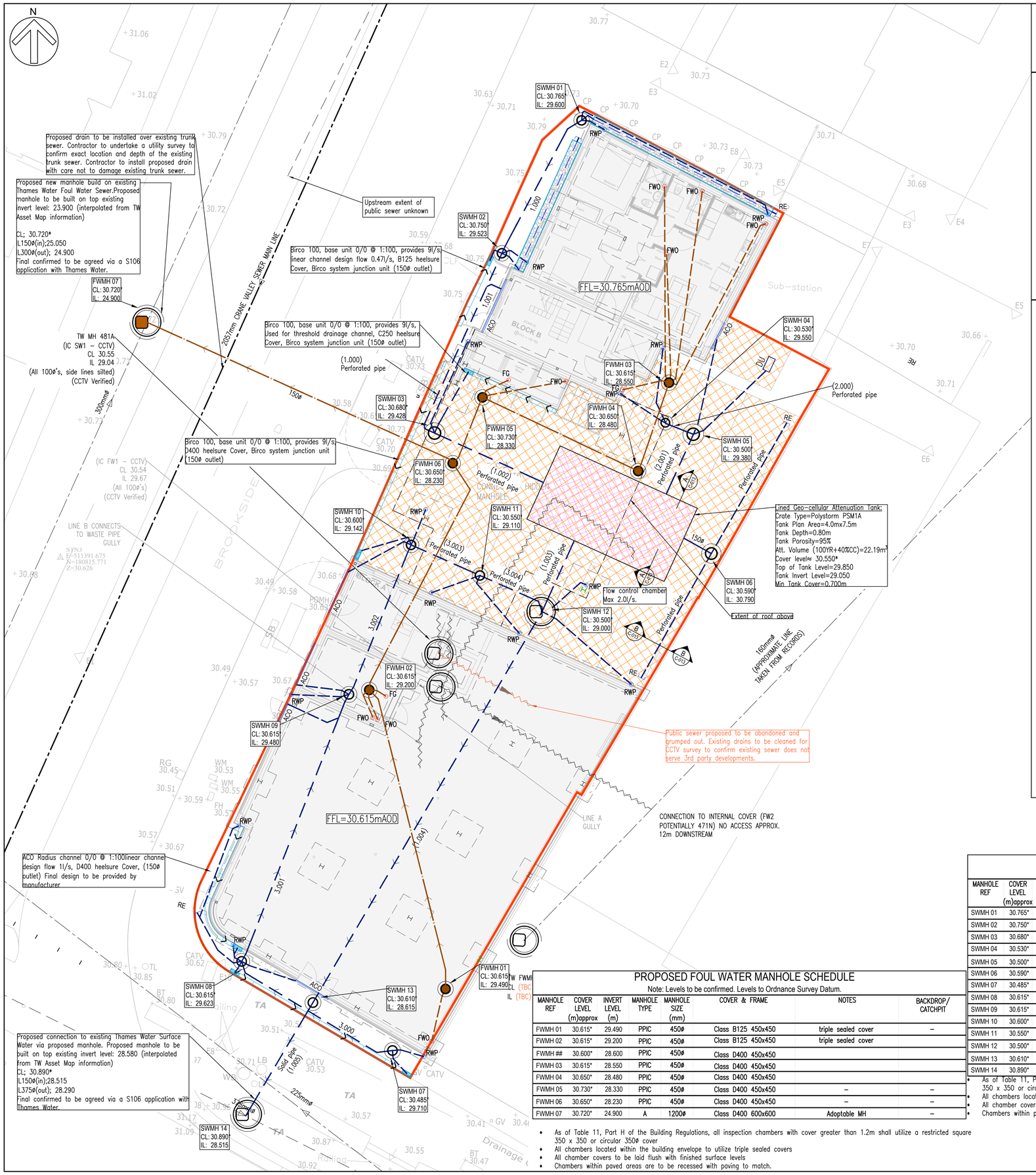
ARCHITECT: MS4 Architects Limited

PROJECT: 152-154 Uxbridge Road, Hayes (UB4 0JH)

DRAWING TITLE: Existing Drainage Plan

SCALE @ A1:	CHECKED / APPROVED BY:	DATE:
1:100	DM	May 2025

PROJECT No:	DRAWING No:	REV:
2-079	C-001	P1



GENERAL LEGEND:

Total red line boundary (0.070 ha)

EXISTING DRAINAGE LEGEND

- Existing Thames Water Foul Water Drainage. (Drainage information as taken from Thames Water asset mapping) (Extents, depth, condition and size to be confirmed onsite via CCTV survey)
- Existing Thames Water Surface Water Drainage. (Drainage information as taken from Thames Water asset mapping) (Extents, depth, condition and size to be confirmed onsite via CCTV survey)
- Existing Private Foul Water Drainage.
- Existing Private Surface Water Drainage.

DRAINAGE BELOW GROUND LEVEL LEGEND

- Proposed Private Surface Water Drainage. (Refer to Causeway Flow calculations for pipe diameter).
- Proposed Rain Water Pipe (RWP). Min. gradient 1:80. (Proposed RWP positions taken from MS4 Architects, DWG No. 200–A, rev T2, dated 28–04–2025 & DWG No. 200–B, rev T3, dated 28–04–2025)
- Proposed Rodding Eye
- Proposed ACO Threshold drain channel (60mm), A15 Heelguard cover grate
- Proposed Linear Drainage channel. (refer to plan for exact details).
- Proposed Permavoid diffuser unit (osa)
- Indicates Cover level is indicative and to match proposed finished surface level.
- FFL=30.765mAOD — Proposed Finished Floor Levels (FFL's) (Proposed FFL's confirmed by Architect per email dated 16–05–2025)
- Proposed Permeable construction with lined sub–base.
- Proposed Underground Geo–cellular storage crates
- Existing pipes to be grubbed out and removed from site
- Proposed 0.5m wide Land Drainage / Filter Drain
- Proposed Private Foul Water Drainage (Pipe diameter to be 150mm).
- Proposed Foul Water Outlet (FWO), 100ø, Min. gradient 1:40. (Proposed FWO positions taken from Artius Designs Limited, DWG No.20078–M–52–0C, rev T1, dated 27–04–2025)
- Existing sewer to be abandoned.

PROPOSED FOUL WATER MANHOLE SCHEDULE

Note: Levels to be confirmed. Levels to Ordnance Survey Datum.

MANHOLE REF	COVER LEVEL (m)approx	INVERT LEVEL (m)	MANHOLE TYPE	MANHOLE SIZE (mm)	COVER & FRAME	NOTES	BACKDROP/ CATCHPIT
FWMH 01	30.615*	29.490	PPIC	450ø	Class B125 450x450	triple sealed cover	–
FWMH 02	30.615*	29.200	PPIC	450ø	Class B125 450x450	triple sealed cover	
FWMH ##	30.600*	28.600	PPIC	450ø	Class D400 450x450		
FWMH 03	30.615*	28.550	PPIC	450ø	Class D400 450x450		
FWMH 04	30.650*	28.480	PPIC	450ø	Class D400 450x450		
FWMH 05	30.730*	28.330	PPIC	450ø	Class D400 450x450	–	–
FWMH 06	30.650*	28.230	PPIC	450ø	Class D400 450x450	–	–
FWMH 07	30.720*	24.900	A	1200ø	Class D400 600x600	Adoptable MH	–

- As of Table 11, Part H of the Building Regulations, all inspection chambers with cover greater than 1.2m shall utilize a restricted square 350 x 350 or circular 350ø cover
- All chambers located within the building envelope to utilize triple sealed covers
- All chamber covers to be laid flush with finished surface levels
- Chambers within paved areas are to be recessed with paving to match.

PROPOSED SURFACE WATER MANHOLE SCHEDULE

Note: Levels to be confirmed. Levels to Ordnance Survey Datum.

MANHOLE REF	COVER LEVEL (m)approx	INVERT LEVEL (m)	MANHOLE TYPE	MANHOLE SIZE (mm)	COVER & FRAME	NOTES	BACKDROP/ CATCHPIT
SWMH 01	30.765*	29.600	PPIC	450ø	Class B125 450x450	–	–
SWMH 02	30.750*	29.523	PPIC	450ø	Class B125 450x450	–	–
SWMH 03	30.680*	29.428	PPIC	600ø	Class D400 600x600	–	CATCHPIT
SWMH 04	30.530*	29.550	PPIC	450ø	Class D400 450x450	–	–
SWMH 05	30.500*	29.380	PPIC	600ø	Class D400 600x600	–	CATCHPIT
SWMH 06	30.590*	30.790	PPIC	600ø	Class D400 600x600	–	CATCHPIT
SWMH 07	30.485*	29.710	PPIC	450ø	Class D400 450x450	–	–
SWMH 08	30.615*	29.623	PPIC	450ø	Class D400 450x450	–	–
SWMH 09	30.615*	29.480	PPIC	450ø	Class B125 450x450	triple sealed cover	–
SWMH 10	30.600*	29.142	PPIC	450ø	Class D400 450x450	–	–
SWMH 11	30.550*	29.110	PPIC	450ø	Class D400 450x450	–	CATCHPIT
SWMH 12	30.500*	29.000	2	1200ø	Class D400 600x600	Flow Control MH @ 2.0l/s MAX.	CATCHPIT
SWMH 13	30.610*	28.615	PPIC	450ø	Class D400 450x450	–	–
SWMH 14	30.890*	28.515	B	1200ø	Class D400 600x600	Adoptable MH	–

- As of Table 11, Part H of the Building Regulations, all inspection chambers with cover greater than 1.2m shall utilize a restricted square 350 x 350 or circular 350ø cover
- All chambers located within the building envelope to utilize triple sealed covers
- All chamber covers to be laid flush with finished surface levels
- Chambers within paved areas are to be recessed with paving to match.

DO NOT SCALE

GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
8. This drawing should not be used for setting out
9. All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

DRAINAGE

1. All drain runs constructed with less than 600mm cover between finished ground level and crown of the pipe are to be encased with a minimum of 150mm Grade ST4 concrete. The casing concrete is to be jointed at every pipe joint position with 20mm Flexcel board to form joint and provide joint flexibility.
2. All pipework 300mmØ or below, that convey corrosive chemicals, to be verified clay pipes. All pipework greater than 300mm Ø to be Class H concrete.
3. All SWP/SS and RWP building spurs to be 100Ø pipework laid at 1:40 for foul water and 1:80 for surface water.
4. All oil/forecourt/washdown separators to be fitted with high level alarm located within xxx building. Ducting arrangement by M&E Engineer
5. Installation of oil / washdown / forecourt seperators and pump stations to be undertaken in strict accordance with manufacturer instruction and installation details.
6. Refer to Architect and / or Mechanical & Electrical design packages for Rain Water Pipe (RWP) and Foul Water Outlet (FWO) exact setting out positions
7. All building drainage to be installed and tested in compliance with the "Building Regulations Approved Document H, 2015 Edition and design shown herein to be agreed for compliance by Building Control prior to construction commencing
8. Insitu concrete for use in general drainage works shall be in accordance with BS:8500 and in accordance with the recommendations of the site investigation report, and in accordance with BRE digest 1 "concrete in aggressive ground" to meet any expected sulphate conditions.
9. All gullies, channels and manhole covers are to be set 5mm lower than indicated on the drawing (i.e. 5mm lower than the adjacent surface). All drain and sewer pipes are to be laid soffit to soffit, unless shown otherwise.
10. All above–ground drainage to incorporate rodding access facilities.
11. All manhole covers and frames shall be manufactured from ductile iron and comply with BSEN:124 and be marked 'FW' or 'SW. They shall be non–ventilating type and have closed keyways. the minimum frame depth shall be 100mm.
12. Small lightweight access covers should be secured (e.g. with screws) to defer unauthorised access.
13. Manholes deeper than 1m to have galvanised steel step irons or fixed ladders.
14. Contractor to undertake a pre–construction CCTV drainage survey to confirm that no existing third party connections require maintaining or diverting through the development site.
15. Exact arrangement of Geo–cellular storage to provide sufficient access for maintenance and venting will be subject to specific manufacturer product details. It is recommended therefore, a design of geo–cellular storage is obtained from the clients chosen manufacturer prior to works commencing
16. As of Table 11, Part H of the Building Regulations ("Drainage and Waste Disposal"), all inspection chambers with cover greater than 1.2m shall utilize a restricted square 350 x 350 or circular 350ø cover
17. Unless explicitly confirmed to us, it is assumed drainage Traps in relation to surface and foul water, will be incorporated within foul water sanitary appliances / gullies or otherwise suitably specified by the M&E engineer as part of their above ground drainage design.
18. All chambers located within the building envelope to utilize triple sealed covers
19. All chamber covers to be laid flush with finished surface levels
20. Chambers within paved areas are to be recessed with paving to match.
21. The formation level of all permeable paving shall either be flat or fall at the same gradient as the surface finish levels towards the closest sub formation drainage outlet
22. All adoptable sewers to be constructed in accordance with the latest revision of "Design Construction Guidance (DCG)" and to the satisfaction of the statutory sewerage undertaker overseeing engineer
23. All drainage running through tree root protection areas or sensitive soft landscaped areas to be reviewed and agreed with arboriculturist prior to construction commencing
24. Where provision is shown on this plan in relation to building envelope waterproofing (cavity drainage or similar), this should be assumed to be indicative and subject to specialist third party design
25. Exact pump station arrangement, size, pump specification and associated rising main and venting design (if applicable) by others.

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD
P1	14–07–2025	YP	PLANNING CONDITION DISCHARGE	YP	DM

DRAWING STATUS: FOR PLANNING

CIVILISTIX
Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: JP & S Services Ltd

ARCHITECT: MS4 Architects Limited

PROJECT: 152-154 Uxbridge Road, Hayes (UB4 0JH)

DRAWING TITLE: Proposed Private Drainage GA Plan

SCALE @ A1:	CHECKED / APPROVED BY:	DATE:
1:100	DM	May 2025

PROJECT No:	DRAWING No:	REV:
2-079	C-002	P1

GENERAL LEGEND:

Total red line boundary (0.070 ha)

CATCHMENT PLAN LEGEND:

Catchment Area (ha)	Impermeable Area (ha)	Direct Discharge location
Catchment 1	0.068ha	Thames Water Surface Water Sewer
	Total 0.068ha	

DO NOT SCALE

GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions. the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
8. This drawing should not be used for setting out
9. All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD
P1	14-07-2025	YP	PLANNING CONDITION DISCHARGE	YP	DM

DRAWING STATUS: FOR PLANNING

CIVILISTIX
Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civilistix.com
www.civilistix.com

CLIENT: JP & S Services Ltd

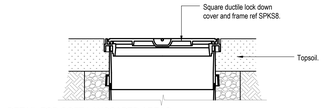
ARCHITECT: MS4 Architects Limited

PROJECT: 152-154 Uxbridge Road, Hayes (UB4 0JH)

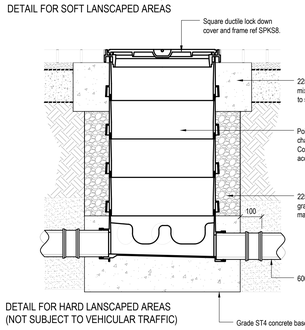
DRAWING TITLE: Proposed Surface Water Catchment Plan

SCALE @ A1:	CHECKED / APPROVED BY:	DATE:
1:100	DM	May 2025

PROJECT No:	DRAWING No:	REV:
2-079	C-003	P1

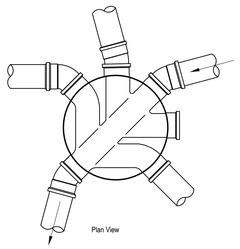


DETAIL FOR SOFT LANSCAPED AREAS



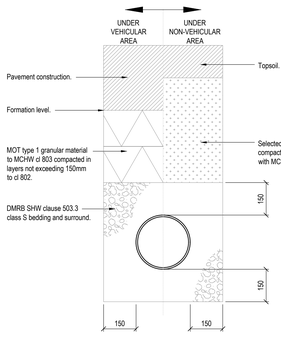
DETAIL FOR HARD LANSCAPED AREAS
(NOT SUBJECT TO VEHICULAR TRAFFIC)

Typical Hepworth PPIC Manhole Detail (1:10)

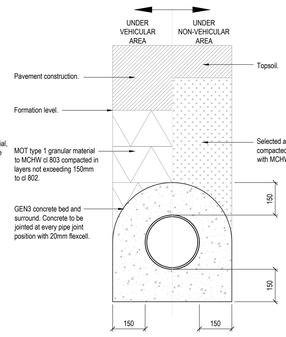


1. In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change of direction for the drainage system, short radius bends of 11¼°, 15°, 30° and 45°can be used in the inlet and outlet to achieve the required angle.
2. Side inlet branch connections enter the inspection chamber approx. 55mm above the invert of the main channel
3. 320mm dia. chambers are supplied with 2no. blanking plugs for the side inlets and 460mm dia. chambers are supplied with 3no. blanking plugs.

Chamber Plan View (1:10)

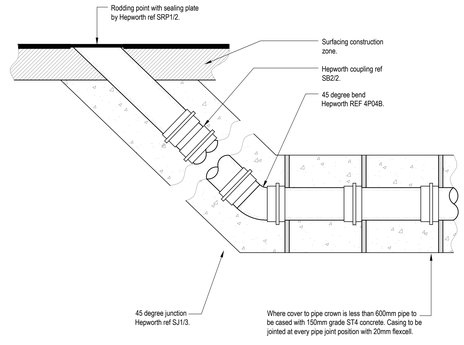


Class S granular pipe bed and surround
To be used for plastic, vitrified and concrete pipework where cover to crown is greater than 900mm.

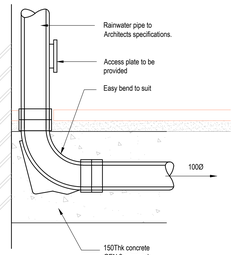


Class Z granular pipe bed and surround
To be used for plastic, vitrified and concrete pipework where cover to crown is less than 900mm.

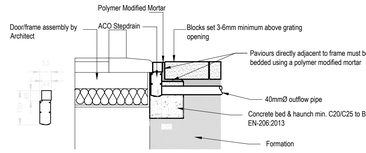
Pipe Bedding Details (1:10)



Rodding Eye Detail at Head of Run/On Branch Drain (1:10)



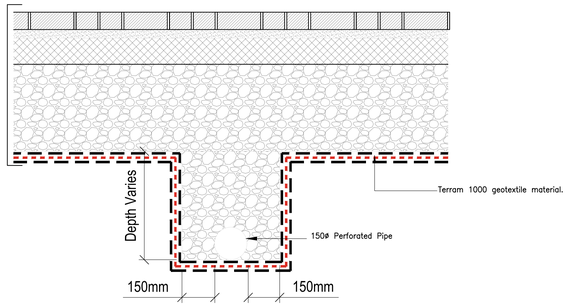
RWP Detail (1:10)



Blocks laid directly against a channel must be laid as a soldier course and restrained from movement by bedding securely on the concrete haunch e.g. by using a polymer modified mortar for bed and perpendicular joints (e.g. Ronafix mortar mix C or similar) Blocks or slabs bedded on sand remote from the channel should be set at a higher level to compensate for possible settlement of the paving in service

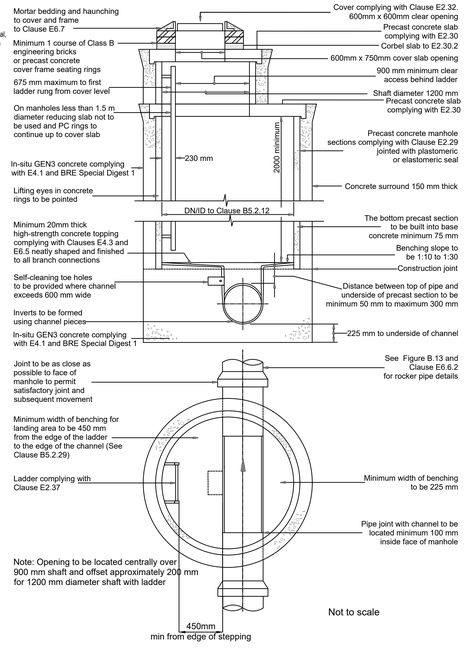
ACO Stepdrain (1:10)

Slimline Domestic Level Threshold Door Drainage

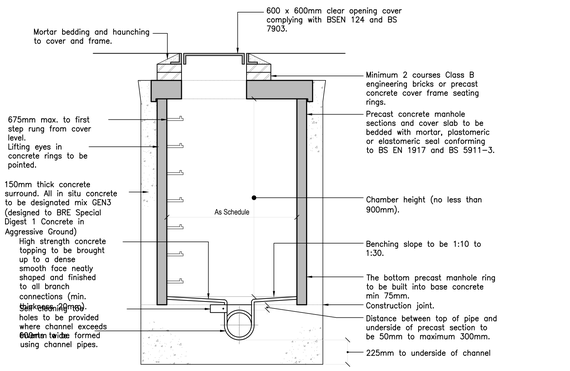


Section B-B - Typical Sub-Formation Drainage Arrangement (1:10)

FIGURE B 5
TYPICAL MANHOLE DETAIL - TYPE A1
Depth from cover level to soffit of pipe 3 m to 6 m
with ladder and reducing slab
Rigid material construction with concrete surround



Not to scale



Typical Catchpit Detail - Type D (1:20)

(Max depth from cover level to soffit of pipe of 2.0m)
Manhole construction shall comply with 'Design and Construction Guidance for foul and surface water sewers'

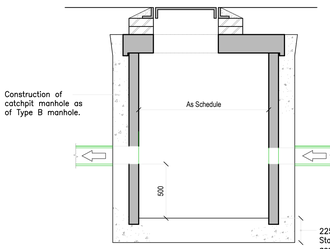
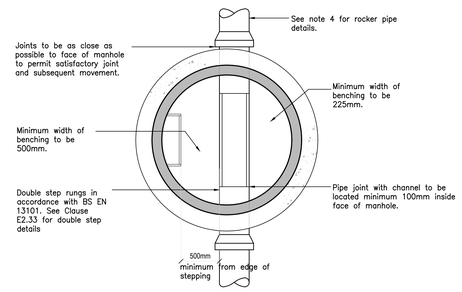
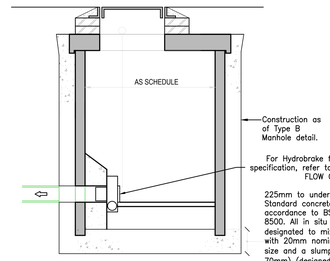
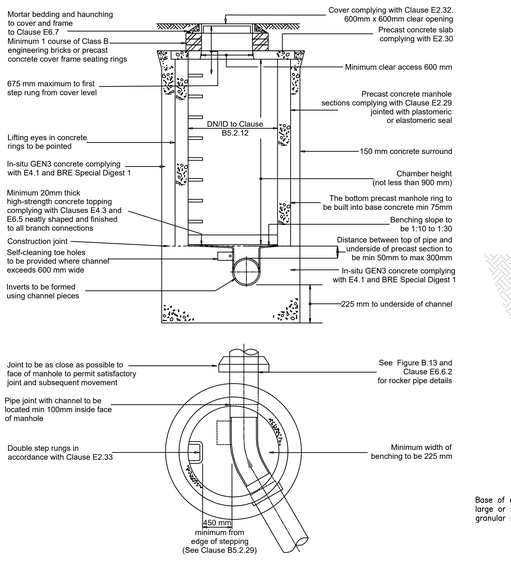


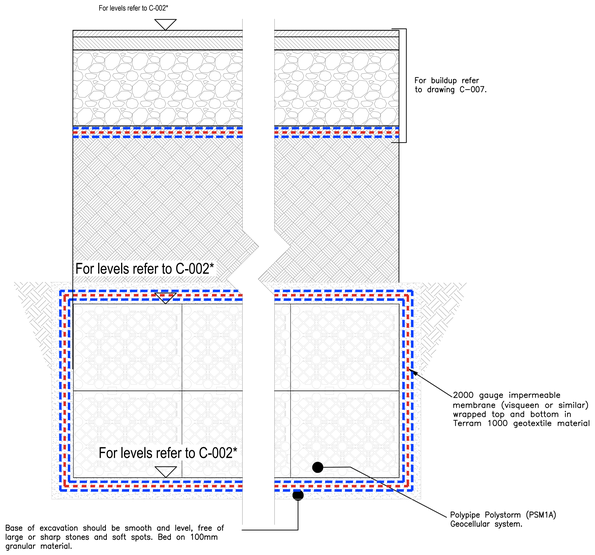
FIGURE B 10
TYPICAL MANHOLE DETAIL - TYPE B
Depth from cover level to soffit of pipe 1.5 m to 3.0 m
Rigid material construction with concrete surround







Not to scale



Section A-A - Typical Geo-Cellular Lined Tank Detail (1:10)

DO NOT SCALE

GENERAL

1. The contractor shall comply with the health and safety requirements as set out in the CDM Regulations
2. All works are to be undertaken in accordance with the Building Regulations and latest relevant British Standards.
3. Conflicting information between this drawing and information given by others must be referred to the engineer before the works commence.
4. The contractor shall, before commencing the works, verify all existing outfall invert levels and site and setting out dimensions, the contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions, and alignment of all parts of the works. Any discrepancies are to be reported to the Engineer
5. All products used are to be CE marked in accordance with the Construction Products Directive CPD/89/106/EEC.
6. The contractor shall be responsible for locating all existing utilities prior to commencing construction and protecting all existing services affected by the works.
7. Any unidentified hazards discovered during the progress of works are to be reported immediately to the engineer.
8. This drawing should not be used for setting out
9. All land, ownership and asset boundaries / extents, shown on this plan should be assumed to be indicative and should be legally verified prior to any works commencing

DRAINAGE

1. All drain runs constructed with less than 600mm cover between finished ground level and crown of the pipe are to be encased with a minimum of 150mm of class C14 concrete. The casing concrete is to have joints at every pipe joint position with 20mm Flexcell board to form joint and provide joint flexibility.
2. All pipework 300mmØ or below, that convey corrosive chemicals, to be vertified clay pipes. All pipework greater than 300mm Ø to be Class H concrete.
3. All SVP/SS and RWP building spurs to be 100Ø pipework laid at 1:40 for foul water and 1:80 for surface water.
4. All oil/forecourt/washdown separators to be fitted with high level alarm located within xxx building. Ducting arrangement By M&E Engineer.
5. Installation of oil / washdown / forecourt seperators and pump stations to be undertaken in strict accordance with manufacturer instruction and installation details.
6. Refer to Architect and / or Mechanical & Electrical design packages for Rain Water Pipe (RWP) and Foul Water Outlet (FWO) exact setting out positions.
7. All building drainage to be installed and tested in compliance with the Building Regulations Approved Document H, 2015 Edition and design shown herein to be agreed for compliance by Building Control prior to construction commencing.
8. In-situ concrete for all general drainage works shall be in accordance with the BS8500 and in accordance with the recommendations of the site investigation report, and in accordance with BRE digest 11 "concrete in aggressive ground" to meet any expected sulphate conditions.
9. All gullies, channels and manhole covers are to be set 5mm lower than indicated on the drawing (i.e. 5mm lower than the adjacent surface). All drain and sewer pipes are to be laid true to soffit, unless shown otherwise.
10. All above-ground drainage to incorporate rodding access facilities.
11. All manhole covers and frames shall be manufactured from ductile iron and comply with BSEN:124 and be marked 'FW' or 'SW.' They shall be non-ventilating type and have closed keyways. The minimum frame depth shall be 100mm.
12. Small lightweight access covers should be secured (e.g. with screws) to deter unauthorised access.
13. Manholes deeper than 1m to have galvanised steel step irons or fixed ladders.
14. Contractor to undertake a pre-construction CCTV drainage survey to confirm that no existing third party connections require maintaining or diverting through the development site.
15. Exact arrangement of Geo-cellular storage to provide sufficient access for maintenance and cleaning, venting as required by specific manufacturer's geo-product details. All assumptions therefore in design of geo-cellular storage is obtained from the clients chosen manufacturer prior to works commencing
16. As of Table 11, Part H of the Building Regulations ("Drainage and Waste Disposal"), all inspection chambers with cover greater than 0.6m must utilize a restricted square 450 x 300 or circular 600 mm dia.
17. Unless explicitly confirmed to us, it is assumed drainage Traps in relation to surface and foul water, will be incorporated within foul water sanitary appliances / gullies or otherwise suitably specified by the M&E engineer as part of their above ground drainage design.
18. All chambers located within the building envelope to utilize triple sealed covers
19. All chamber covers to be laid flush with finished surface levels
20. Chambers within paved areas are to be recessed with paving to match.
21. The formation level of all permeable paving shall either be flat or fall at the same gradient as the surface finish levels towards the closest sub formation drainage outlet
22. All adoptable sewers to be constructed in accordance with the latest revision of "Design Construction Guidance (DCG)" and to the satisfaction of the statutory sewerage undertaker overseeing engineer
23. All drainage running through tree root protection areas or sensitive soft landscaped areas to be reviewed and agreed with arboriculturist prior to construction commencing
24. Where provision is shown on this plan in relation to building envelope waterproofing (cavity drainage or similar), this should be assumed to be indicative and Subject to specialist third party design
25. Exact pump station arrangement, size, pump specification and associated rising main and venting design (if applicable) by others.

REV	DATE	BY	SUMMARY OF CHANGE	CHK	APD
P1	14-07-2025	YP	PLANNING CONDITION DISCHARGE	YP	DM

DRAWING STATUS:
FOR PLANNING

CIVILISTIX
Allia Future Business Centre, The Guildhall, Cambridge (CB2 3QJ)
Tel: +44 (0)1223 343 277 E: enquiries@civilistix.com
www.civilistix.com

CLIENT:
JP & S Services Ltd

ARCHITECT:
MS4 Architects Limited

PROJECT:
152-154 Uxbridge Road, Hayes
(UB4 0JH)

DRAWING TITLE:
Proposed Private Drainage Construction Details

SCALE @ A0:	CHECKED / APPROVED BY:	DATE:
As Shown	DM	May 2025

PROJECT No:	DRAWING No:	REV:
2-079	C-004	P1

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.600
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
SWMH 01	0.005	4.00	30.765	450	511417.604	180837.521	1.165
SWMH 02	0.004	4.00	30.750	450	511413.630	180830.901	1.227
SWMH 03	0.008	4.00	30.680	600	511410.280	180821.963	1.252
SWMH 04	0.007	4.00	30.530	450	511421.741	180822.463	0.980
SWMH 05	0.012	4.00	30.500	600	511423.148	180821.901	1.120
SWMH 07		4.00	30.485	450	511408.189	180791.258	0.775
SWMH 08			30.615	450	511400.689	180795.689	0.992
SWMH 09	0.018	4.00	30.615	450	511406.025	180808.969	1.135
SWMH 10	0.003	4.00	30.600	450	511410.863	180815.673	1.458
SWMH 11			30.550	450	511412.547	180814.902	1.440
TANK			30.550	1	511417.228	180816.612	1.500
SWMH 12	0.011	4.00	30.500	1200	511415.627	180813.085	1.500
SWMH 13			30.610	450	511406.317	180792.581	1.995
SWMH 14			30.890	1200	511400.849	180788.106	2.375

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SWMH 01	SWMH 02	7.721	0.600	29.600	29.523	0.077	100.0	150	4.13	50.0
1.001	SWMH 02	SWMH 03	9.545	0.600	29.523	29.428	0.095	100.5	150	4.29	50.0
1.002	SWMH 03	TANK	5.947	0.600	29.428	29.050	0.378	15.7	150	4.33	50.0
1.003	TANK	SWMH 12	3.873	0.600	29.050	29.000	0.050	77.5	150	4.38	50.0
1.004	SWMH 12	SWMH 13	22.519	0.600	29.000	28.615	0.385	58.5	150	4.79	50.0
1.005	SWMH 13	SWMH 14	7.066	0.600	28.615	28.515	0.100	70.7	150	4.89	50.0
2.000	SWMH 04	SWMH 05	1.515	0.600	29.550	29.380	0.170	8.9	150	4.01	50.0
2.001	SWMH 05	TANK	4.058	0.600	29.380	29.050	0.330	12.3	150	4.03	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	SWMH 01	SWMH 02	1.005	17.8	0.9	1.015	1.077	0.005	0.0	23	0.527
1.001	SWMH 02	SWMH 03	1.002	17.7	1.6	1.077	1.102	0.009	0.0	31	0.626
1.002	SWMH 03	TANK	2.552	45.1	3.1	1.102	1.350	0.017	0.0	27	1.470
1.003	TANK	SWMH 12	1.143	20.2	6.5	1.350	1.350	0.036	0.0	58	1.019
1.004	SWMH 12	SWMH 13	1.317	23.3	12.3	1.350	1.845	0.068	0.0	78	1.336
1.005	SWMH 13	SWMH 14	1.197	21.2	12.3	1.845	2.225	0.068	0.0	82	1.243
2.000	SWMH 04	SWMH 05	3.395	60.0	1.3	0.830	0.970	0.007	0.0	15	1.357
2.001	SWMH 05	TANK	2.888	51.0	3.4	0.970	1.350	0.019	0.0	26	1.642

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	SWMH 07	SWMH 08	8.711	0.600	29.710	29.623	0.087	100.0	150	4.14	50.0
3.001	SWMH 08	SWMH 09	14.312	0.600	29.623	29.480	0.143	100.0	150	4.38	50.0
3.002	SWMH 09	SWMH 10	8.267	0.600	29.480	29.142	0.338	24.5	150	4.45	50.0
3.003	SWMH 10	SWMH 11	1.852	0.600	29.142	29.110	0.032	57.9	150	4.47	50.0
3.004	SWMH 11	SWMH 12	3.576	0.600	29.110	29.000	0.110	32.5	150	4.51	50.0

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	SWMH 07	SWMH 08	1.005	17.8	0.0	0.625	0.842	0.000	0.0	0	0.000
3.001	SWMH 08	SWMH 09	1.005	17.8	0.0	0.842	0.985	0.000	0.0	0	0.000
3.002	SWMH 09	SWMH 10	2.044	36.1	3.3	0.985	1.308	0.018	0.0	30	1.268
3.003	SWMH 10	SWMH 11	1.324	23.4	3.8	1.308	1.290	0.021	0.0	41	0.976
3.004	SWMH 11	SWMH 12	1.771	31.3	3.8	1.290	1.350	0.021	0.0	35	1.207

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	7.721	100.0	150	Circular	30.765	29.600	1.015	30.750	29.523	1.077
1.001	9.545	100.5	150	Circular	30.750	29.523	1.077	30.680	29.428	1.102
1.002	5.947	15.7	150	Circular	30.680	29.428	1.102	30.550	29.050	1.350
1.003	3.873	77.5	150	Circular	30.550	29.050	1.350	30.500	29.000	1.350
1.004	22.519	58.5	150	Circular	30.500	29.000	1.350	30.610	28.615	1.845
1.005	7.066	70.7	150	Circular	30.610	28.615	1.845	30.890	28.515	2.225
2.000	1.515	8.9	150	Circular	30.530	29.550	0.830	30.500	29.380	0.970
2.001	4.058	12.3	150	Circular	30.500	29.380	0.970	30.550	29.050	1.350
3.000	8.711	100.0	150	Circular	30.485	29.710	0.625	30.615	29.623	0.842
3.001	14.312	100.0	150	Circular	30.615	29.623	0.842	30.615	29.480	0.985
3.002	8.267	24.5	150	Circular	30.615	29.480	0.985	30.600	29.142	1.308
3.003	1.852	57.9	150	Circular	30.600	29.142	1.308	30.550	29.110	1.290
3.004	3.576	32.5	150	Circular	30.550	29.110	1.290	30.500	29.000	1.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SWMH 01	450	Manhole	Adoptable	SWMH 02	450	Manhole	Adoptable
1.001	SWMH 02	450	Manhole	Adoptable	SWMH 03	600	Manhole	Adoptable
1.002	SWMH 03	600	Manhole	Adoptable	TANK	1	Manhole	Adoptable
1.003	TANK	1	Manhole	Adoptable	SWMH 12	1200	Manhole	Adoptable
1.004	SWMH 12	1200	Manhole	Adoptable	SWMH 13	450	Manhole	Adoptable
1.005	SWMH 13	450	Manhole	Adoptable	SWMH 14	1200	Manhole	Adoptable
2.000	SWMH 04	450	Manhole	Adoptable	SWMH 05	600	Manhole	Adoptable
2.001	SWMH 05	600	Manhole	Adoptable	TANK	1	Manhole	Adoptable
3.000	SWMH 07	450	Manhole	Adoptable	SWMH 08	450	Manhole	Adoptable
3.001	SWMH 08	450	Manhole	Adoptable	SWMH 09	450	Manhole	Adoptable
3.002	SWMH 09	450	Manhole	Adoptable	SWMH 10	450	Manhole	Adoptable
3.003	SWMH 10	450	Manhole	Adoptable	SWMH 11	450	Manhole	Adoptable
3.004	SWMH 11	450	Manhole	Adoptable	SWMH 12	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Node SWMH 12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	29.000	Product Number	CTL-SHE-0066-2000-1064-2000
Design Depth (m)	1.064	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node TANK Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.050	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	156	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	7.500		

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	SWMH 01	116	29.829	0.229	1.0	0.0560	0.0000	SURCHARGED
120 minute winter	SWMH 02	116	29.829	0.306	1.8	0.0685	0.0000	SURCHARGED
120 minute winter	SWMH 03	116	29.828	0.400	3.4	0.1646	0.0000	SURCHARGED
120 minute winter	SWMH 04	116	29.831	0.281	1.4	0.0848	0.0000	SURCHARGED
120 minute winter	SWMH 05	118	29.829	0.449	3.8	0.2232	0.0000	SURCHARGED
120 minute winter	SWMH 07	116	29.830	0.120	0.3	0.0191	0.0000	OK
120 minute winter	SWMH 08	116	29.830	0.207	0.7	0.0328	0.0000	SURCHARGED
120 minute winter	SWMH 09	116	29.830	0.350	3.6	0.1664	0.0000	SURCHARGED
120 minute winter	SWMH 10	116	29.830	0.688	4.2	0.1375	0.0000	SURCHARGED
120 minute winter	SWMH 11	116	29.829	0.719	3.8	0.1143	0.0000	SURCHARGED
120 minute winter	TANK	116	29.828	0.778	10.3	22.1857	0.0000	SURCHARGED
120 minute winter	SWMH 12	116	29.829	0.829	5.7	1.0597	0.0000	SURCHARGED
960 minute summer	SWMH 13	510	28.646	0.031	1.9	0.0050	0.0000	OK
960 minute summer	SWMH 14	510	28.545	0.030	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	SWMH 01	1.000	SWMH 02	1.0	0.437	0.056	0.1359	
120 minute winter	SWMH 02	1.001	SWMH 03	1.8	0.692	0.102	0.1680	
120 minute winter	SWMH 03	1.002	TANK	3.4	1.120	0.075	0.1047	
120 minute winter	SWMH 04	2.000	SWMH 05	1.4	0.868	0.023	0.0267	
120 minute winter	SWMH 05	2.001	TANK	3.6	1.275	0.071	0.0714	
120 minute winter	SWMH 07	3.000	SWMH 08	-0.3	-0.046	-0.016	0.1425	
120 minute winter	SWMH 08	3.001	SWMH 09	-0.7	-0.051	-0.041	0.2520	
120 minute winter	SWMH 09	3.002	SWMH 10	3.6	0.766	0.100	0.1455	
120 minute winter	SWMH 10	3.003	SWMH 11	3.8	0.713	0.162	0.0326	
120 minute winter	SWMH 11	3.004	SWMH 12	3.5	0.334	0.111	0.0630	
120 minute winter	TANK	1.003	SWMH 12	-3.5	-0.197	-0.171	0.0682	
120 minute winter	SWMH 12	1.004	SWMH 13	1.9	0.749	0.081	0.0568	
960 minute summer	SWMH 13	1.005	SWMH 14	1.9	0.725	0.089	0.0184	52.4