B. GROUND INVESTIGATION REPORT

Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

Ground Investigation

St Mary's University

September 2024

P24-234

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ISSUE	DATE	Written By	Comments
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For and on behalf of Paddock Geo Engineering Limited			

1.0 INTRODUCTION

Paddock Geo Engineering Limited (PGE) were instructed by St Mary's University; the Client, to undertake a Ground Investigation including a geotechnical appraisal and Generic Site Contamination Assessment as Stage 2 Tier 2 (formerly referred to as Phase 2) of a Site Contamination Assessment of the subject site, referred to as Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX.

The overall objective of the associated Preliminary Contamination Risk Assessment was to inform the Client of the ground conditions and any potential environmental or ground-related risks associated with the development of the site. The Risk Assessment undertaken relates to the redevelopment of the site for continued educational use. As student accommodation is situated around the subject site, the stringent criteria of 'Residential without homegrown produce' will be utilised for assessments.

1.1 Terms of Reference

- Land Contamination Risk Management (LCRM) 2023, Environment Agency
- British Standards BS 10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice.
- BS 5930:2015 Site Investigation Code of Practice
- PPG23 (PPS23) Planning and pollution control (contaminated land aspects), 2002 (withdrawn)
- GPLC1 Guiding Principles for Land Contamination, 2010, Environment Agency
- Environmental Protection Act: 1990 – Contaminated Land Statutory Guidance, April 2012, DEFRA
- BS EN 1997-2, Eurocode 7. Geotechnical design. Ground investigation and Testing
- BS EN ISO 22475 Series (1-3), Geotechnical investigation and testing. Sampling methods and groundwater measurements.
- NHBC Standards Chapter 4.2 2006, Building Near Trees
- TRL Laboratory Report 1132:1984 – The Structure of Bituminous Road, Appendix C Table C1
- BS EN ISO 22475 Series (1-3), Geotechnical investigation and testing. Sampling methods and groundwater measurements.
- BRE412 1996 Desiccation in Clay Soils
- BRE240 1993 Low Rise Buildings on Shrinkable Clay Soils: Part 1
- BRE241 1990 Low Rise Buildings on Shrinkable Clay Soils: Part 2
- BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings. CIRIA 2007
- NHBC report No 10627-R01(04) Guidance on development proposals on sites where methane and carbon dioxide are present (March 2007)
- CL:AIRE Research Bulletin RB17 A pragmatic approach to ground gas risk assessment (November 2012)

- CIRIA C735 Good practice and verification of protection systems for buildings against hazardous ground gases.

1.2 Objectives

The objective of the Ground Investigation for the site comprised the following elements:

- An Intrusive Investigation;
- A Site Contamination Assessment including a Generic Human Health Risk Assessment; and Ground Gas Risk Assessment;
- A Geotechnical Appraisal;
- A Waste Classification Assessment.

The scope of work was discussed and agreed with the Client prior to commencement. The investigation was carried out in order to provide data on the sub-soil characteristics of the site, the groundwater regime and also to recover samples for geotechnical laboratory testing and chemical analysis. This data was employed to derive a ground model for the site, foundation design criteria and a generic human health contamination risk assessment including ground gas risk assessment.

2.0 THE SITE

2.1 Site Description

The subject site comprises a roughly square shaped plot of land within the St Mary's University, Strawberry Hill, Twickenham Campus, accessible off an access road adjoining the public road, Waldegrave Road, some 100m northwest of the subject site.

The site is situated in Twickenham, some 4.3km southwest of Richmond upon Thames in southwest London. The subject site covers an area of approximately 0.12 hectares, with the centre of the site at approximate national grid reference 515850, 171940.

Site Location Plans and an Aerial Photograph are presented in Appendix A.

2.2 Proposed Development

The proposed development scheme is understood to comprise the demolition of the existing subject teaching building and to construct a new teaching space with associated access areas. It is understood that the project is still within the design phase but is likely to be 2-stories high and constructed using conventional techniques.

As the proposed development does not include private garden areas, but is adjoining student accommodation, the soil contamination exposure characteristics for the proposed development will be comparable to a residential without homegrown produce scenario.

3.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT SUMMARY

An associated Preliminary Contamination Risk Assessment (PRA) has been carried out for the site by PGE reference P24-234pra, with which reference should be made. Salient data from the PRA report has been summarised and extracted and presented in the following sections for reference.

3.1 Historic Land Use on the Site and Surrounding Area

The earliest available map is dated 1865 and shows the site to comprise part of a parcel of undeveloped agricultural land. A large mansion is located to the north of the site with sporadic buildings surrounding the area. The area is just north of Teddington. Rows of residential dwellings were constructed around the site as early as 1896. Between 1914 and 1920, a large railway depot was constructed from 300m to the northwest of the site.

The site became known as 'St Mary's Training College between 1934 and 1935 with significant residential expansion in the surrounding area. In the 1960's and 1970's, further expansion of the College occurred along with wider residential development.

Between 1967 and 1979, a building was constructed west of the site and was developed further in the 1990s to accommodate a new building with minor alterations show to the footprint in the years following.

Significant gravel pits were noted to the east of the River Thames c.600m east of the site

3.2 PRA Walkover Description

A site walkover survey was conducted on 13th August 2024 by a representative of Paddock Geo Engineering Limited. A series of photographs taken during the walkover survey are presented in Appendix B along with a Site Walkover Survey Plan.

The site is located within the wider university grounds of St Mary's University which extends in all directions. The subject site currently comprises an existing mixed level one and two storey teaching space and gymnasium. The site also encompassed external areas surfaced with a mix of soft landscaping and hardstanding. The car park to the east of the site was uneven, disturbed by tree root growth and general ground topography.

The boundaries of the site are as follows:

- Northern boundary – Access road with sports pitch beyond.
- Eastern boundary – Car park with additional university ground beyond.
- Southern boundary – Residential student accommodation.
- Western boundary – Adjoining teaching space which extends to the west of the subject site.

Mature-trees are situated at the north of the existing building, and semi mature trees, and vegetation are along the south of the existing building.

The site in general appears to be low risk in terms of potential sources of onsite contamination with no significant sources of contamination noted during the walkover. However, as with all urban legacy sites, there is the potential for Made Ground soils to be encountered beneath the existing concrete slabs situated within the farmyard area to the northeast of the site.

3.3 Surrounding Area

The site is situated in a suburban area, within Twickenham in southwest London.

The surrounding area is dominated by residential dwellings with several large parks in the surrounding area. The River Thames is located approximately 450m to the east of the site.

No significant sources of potential off-site contamination were identified in the area immediately surrounding the subject site.

The Envirocheck Report identifies 186no. contemporary trade directories within 1km of the site, although the vast majority (177no.) are more than 500m away. The nearest active record relates to 'Pride Installations Ltd, Suite 2, Jardine House, 1c Claremont Road, Teddington, TW11 8DH' located 454m south of the site and is classified as Electrical Engineers.

The nearest inactive record relates to 'Strawberry Hill, 18 Vale Close, Strawberry Vale, Twickenham, TW1 4SF' located 257m east of the site and is classified as Ironing and Home Laundry Services. Other active and inactive entries include car dealers, garage services, art restoration, cemeteries, plant and machinery repairs and domestic appliance repairs.

3 no. fuel station entries are recorded within 1km of the site, the closest being 'New Island Filling Station, 206-208 Stanley Road, Shacklegate Lane, Twickenham, TW1 3DY, some 507m north of the site. All are recorded as obsolete.

The Envirocheck Report identifies 8no. Local Authority Integrated Pollution Prevention and Control entries recorded within 1km of the site. The closest entry is, located 623m southwest, recorded as 'authorisation revoked' and relates to 'PG1/1 Waste Oil Burners, less than 0.4MW net rated thermal input' at Bollingmore & Co. Ltd, 14 Elmtree Road, Teddington, Middlesex, TW11 8ST. Other entries relate to petrol filling stations and dry cleaners.

3.4 Geology, Hydrogeology and Hydrology

3.4.1 Geology

Information on the underlying geology at the site has been obtained from the British Geological Survey (BGS) Geological Map Viewer and Geological Mapping provided by Landmark within the Envirocheck Report.

The geological maps indicate that the site is underlain by superficial deposits of the Kempton Park Gravel Member.

The geological mapping indicates the bedrock underlying the superficial deposits to be the London Clay Formation, which comprises sedimentary clay and silt formed between 56 and 47.8 million years ago during the Palaeogene period.

Geological mapping by the BGS shows the surface expression of local geology, typically within the top 1.2m of the surface. As such the soils encountered at depth may vary from those shown on the mapping.

A large area of infilled (Made) Ground is recorded east of the River Thames, from c. 750m from the site, in the geological maps provided within the associated Envirocheck Report.

3.4.2 Borehole Records

A search was made of the online BGS database for published borehole records within the area.

The nearest borehole to the subject site is mapped c.400m east of the site and is situated along the A310, next to the River Thames. The borehole, reference TQ17SE129, was drilled to 9.00m bgl and identified c.2.80m of Made Ground overlying a soft clay (presumably alluvium), in turn overlying Kempton Park gravel to 8.00m bgl and London Clay to 9.00m. No further information was presented.

3.4.3 Hydrogeology

The groundwater vulnerability maps for the site and the surrounding areas indicates that the underlying superficial deposits represent a Principal aquifer. These are aquifers that provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.

The underlying London Clay bedrock strata is designated as an Unproductive Strata. Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

The combined groundwater vulnerability on site is considered by Envirocheck to be 'Medium'.

The site is not situated within a Groundwater Source Protection Zone (SPZ) and none are mapped within 1km of the site.

The Envirocheck report lists no groundwater abstractions within 1km of the site, however, 12no. are listed between 1km and 2km. The nearest is listed 1036m southeast of the site and is linked to abstraction from groundwater for spray irrigation for sports facilities.

Given the hydrogeological status of the site, the groundwater in the Kempton Park Gravel Member Deposits could be considered to be of moderate sensitivity.

The BGS groundwater flood susceptibility mapping area indicates the site is situated within an area with "*Potential for Groundwater Flooding of Property Situated Below Ground Level to Occur*". This information does not constitute a groundwater flood risk assessment. A specialist should be consulted for a flood risk assessment of this site.

3.4.4 Hydrology

Envirocheck reports the nearest surface water feature to the site is the River Thames, situated c.402m east of the site.

A total of 24 no. pollution incidents to controlled waters are recorded by Envirocheck within 1km of the site. All apart from two are Category 3 minor incidents. 1no. Category 1 (Major) incident occurred at Strawberry Hill in February 1989, relating to unknown oils. A Category 2 (significant) incident occurred in Twickenham in May 1991, relating to unknown sewage.

The Envirocheck report records no active surface water abstractions within 1km of the site.

There is 1no. discharge consent recorded within 1km of the subject site. This entry is located 830m to the southeast and relates to the discharge of treated domestic sewage into a soakaway.

There are 2no. Substantiated Pollution Incident Register entries recorded within 1km of the site. These are located 775m and 943m respectively and both relate to Oils-Diesel (including agricultural).

The site does not fall within an area at risk of flooding and/or at risk of extreme flooding from Rivers or Sea without defences. This information does not constitute a groundwater flood risk assessment. A specialist should be consulted for a flood risk assessment of this site.

3.4.5 Radon

The subject site is indicated within the Envirocheck Report to be in a lower probability radon area where <1% of homes estimated to be at or above the Action Level. The Envirocheck report records, 'No radon protection measures are necessary in the construction of any new dwellings, buildings or extensions' on site.

3.4.6 Waste Management and Landfill

There are no recorded waste management facilities/local authority landfills/BGS landfills/historical landfills within 1km of the site. 1 no. registered waste treatment or disposal site is recorded 677m south of the site and relates to 'AW White, 4 Latimer Road, Teddington, TW11 8QA' a small scrapyard. The licence has lapsed.

3.4.7 Potential Contaminant Sources

The potential contamination sources identified as part of this Preliminary Contamination Risk Assessment are summarised in the table below. The potential contaminants are based on the data within CL8, Department of the Environment (DoE) Industry Profiles, the current and historic site uses.

Table 1: Potential Contamination Sources

Current Potential On-Site Contaminant Sources	**Potential Contaminants**
Made Ground associated with previous development (hardstanding especially).	Inorganics (heavy metals and metaloids), Organics, hydrocarbons (PAH and TPH), and asbestos. Ground gases.
Historic Potential On-Site Contaminant Sources	**Potential Contaminants**
Potential asbestos containing construction materials on site.	Asbestos
Current Potential Off-Site Contaminant Sources	**Potential Contaminants**
No significant sources identified	-
Historical Potential Off-Site Contaminant Sources	**Potential Contaminants**
Made Ground associated with previous development (hardstanding especially).	Inorganics (heavy metals and metaloids), Organics, hydrocarbons (PAH and TPH), and asbestos.

3.4.8 Conceptual Source-Pathway-Receptor Model

The information gathered in this Preliminary Contamination Risk Assessment has been compiled to produce a Source-Pathway-Receptor (S-P-R) model, which is summarised in the table below and overleaf. A Contamination Conceptual Site Model Cross Section is presented in Appendix F.

The risk posed to site construction workers has not been assessed as any risks are considered to be mitigated through good site practices such as dust suppression and the use of Personal Protective Equipment (PPE).

Table 2: Source-Pathway-Receptor Model for onsite sources

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Current Made Ground associated with previous development on site and existing concrete slabs. **Historical** Potential asbestos containing construction materials on site.	Dermal / direct contact	Current site users (Staff and resident students)	Yes	Low to Moderate
	Direct ingestion		No	
	Direct inhalation		Yes	Low to Moderate
	Inhalation of Radon		No	
	Inhalation of wind-blown dust		Yes	Low to Moderate
	Vapour migration		No	
	Ground gas migration		No	
	Dermal / direct contact	Future site users (Staff and resident students)	Yes	Low to Moderate
	Direct ingestion		No	
	Direct inhalation		Yes	Low to Moderate
	Inhalation of Radon gas		No	
	Inhalation of wind-blown dust		Yes	Low to Moderate
	Vapour Migration onto the site		No	
	Ground gas migration		No	
	Direct contact	Services (following redevelopment)	Yes	Low
	Migration of contaminants: non-aqueous phase		No	
	Migration of contaminants: aqueous phase		No	
	Migration of contaminants off-site: non-aqueous phase	Adjacent Properties	No	
	Migration of contaminants off site: aqueous phase		No	
	Vapour migration		No	
	Inhalation of wind-blown dust	Ecological Impacts (including trees)	Yes	Low
	Migration of contaminants: non-aqueous phase		Yes	Low
	Migration of contaminants: aqueous phase		Yes	Low

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
	Migration of contaminants from site: non-aqueous phase	Controlled groundwater	Yes	Low
	Migration of contaminants from site: aqueous phase		Yes	Low
	Migration of Contaminants: non-aqueous phase	Surface Waters	No	
	Migration of contaminants: aqueous phase		No	

Table 3: Source-Pathway-Receptor Model for off-site sources

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
Current - None **Historical** Made Ground associated with previous development off site.	Dermal / direct contact	Current site users (Staff and resident students)	Yes	Low to Moderate
	Direct ingestion		No	
	Direct inhalation		Yes	Low to Moderate
	Inhalation of Radon		No	
	Inhalation of wind-blown dust		Yes	Low to Moderate
	Vapour migration		No	
	Ground gas migration		No	
	Dermal / direct contact	Future site users (Staff and resident students)	Yes	Low to Moderate
	Direct ingestion		No	
	Direct inhalation		Yes	Low to Moderate
	Inhalation of Radon gas	Current site users (Staff and resident students)	No	
	Inhalation of wind-blown dust		Yes	Low to Moderate
	Vapour Migration onto the site		Yes	Low to Moderate
	Ground gas migration		No	
	Direct contact	Services (following redevelopment)	Yes	Low
	Migration of contaminants: non-aqueous phase		No	
	Migration of contaminants: aqueous phase		No	
	Inhalation of wind-blown dust	Ecological Impacts	No	
	Migration of contaminants: non-aqueous phase		No	
	Migration of contaminants: aqueous phase		No	
	Migration of contaminants from site: non-aqueous phase	Controlled groundwater	No	

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete	Risk Level Classification
	Migration of contaminants from site: aqueous phase		No	
	Migration of Contaminants: non-aqueous phase	Surface Waters	No	
	Migration of contaminants: aqueous phase		No	

3.4.9 Potential Contamination Risk Summary

The preliminary contamination risk assessment has identified complete Source-Pathway-Receptor (SPR) linkages with a worst-case **Very Low to Moderate** risk level from the potential contamination sources and risk drivers identified on the site and surrounding area.

There is the potential for the presence of Inorganics, Organics, hydrocarbons (PAH and TPH), and asbestos within any Made Ground associated with the site's previous development and beneath existing concrete slabs. There is also a risk considered from potential asbestos containing construction materials used historically on the site. The risk with such features are likely to be localised hotspots.

Given these factors there is considered to be a complete S-P-R linkage between any priority contaminant impacted soils on the site through direct contact and inhalation pathways with the proposed highly sensitive end site user and new buried services. These potential contamination features are also deemed to pose a potential hazard to ecology and controlled waters, albeit with a very low risk level.

Whilst significant gravel pits were noted within 600m of the site, they were located to the east of the River Thames and therefore, migration of significant ground gas to impact the site is considered unlikely. Further to this it is considered unlikely that significant deposits of putrescible organic material are present in Made Ground beneath the site, although the presence, nature and extent of any such deposits are currently unknown, therefore, the risk from ground gases on the site is considered lower bound.

Given the discussion above, to assess if a 'Significant Possibility of Significant Harm' is present from potential contamination sources to the proposed future residential site users, it is recommended that an intrusive soil investigation be undertaken focusing on the highlighted potential contaminative features.

Further to this, should any unexpected contamination be identified during the future development groundworks, then a suitably qualified and experienced Geo-Environmental Engineer should be consulted and if necessary further assessment should be undertaken.

3.4.10 Potential Geotechnical Risk Summary

A maximum "Very Low" geotechnical risk was identified on-site within the Envirocheck Report associated with the anticipated underlying natural geology in relation to the volume change of fine-grained soils.

It is recommended that a geotechnical appraisal of the site be carried out to determine the geology and groundwater beneath the site and to derive foundation design criteria for the structures on the site.

4.0 PREVIOUS GROUND INVESTIGATIONS

PGE are not aware of any intrusive ground investigation or contamination risk assessment being carried out on the subject site previously.

5.0 INTRUSIVE INVESTIGATION FIELDWORKS

Following the recommendations and conclusions from the associated PRA, an intrusive investigation was designed to establish the ground conditions beneath the site in relation to the development of a Ground Model for the proposed development and to assess the contamination status of the near surface soils.

The works were also employed to gather geotechnical data to derive geotechnical foundation design parameters, gather infiltration data, to assess the contamination status of the near surface soils and potential for gaseous / volatile contamination on site.

The main fieldworks were carried out over the course of a two days, commencing on 12th August 2024 and comprised the forming of 4no. percussion liner sampler boreholes (WS01 to WS04) and a total of 2no. trial pits, (SA01 and SA02) for infiltration testing to BRE365.

Further to this, 3no. Foundation Inspection Pits (FTP01 – FTP03) were excavated to reveal existing below ground foundation arrangements in locations agreed with the university representative on the day of the works.

Soil strength testing was undertaken in the field employing Standard Penetration Test (SPT) carried out at 1.00m intervals within the percussion liner sampler boreholes.

Hand Vane shear tests were no undertaken due to limited suitable material recovered from all exploratory points.

The exploratory points were positioned in open accessible areas and to clear buried services following a Cable Avoidance Tool (CAT) survey and consultation of buried services plans where available. Service inspection chamber covers were lifted to determine the exact runs of buried services.

The exploratory points were formed to assess the geological succession beneath the site, near surface contamination, to gather geotechnical and groundwater data to derive geotechnical design parameters, to undertake infiltration and percolation testing and to add data to the Ground Model for the site. The details and rationale of the exploratory point placement is summarised below.

Table 4: Exploratory Location Details and Rationale

Exploratory Location (Depth)	Location Details
WS01(3.00m)	North of the existing building, for general coverage.
WS02(3.00m)	East of the existing building, for general coverage.
WS03(2.00m)	South of the existing building, for general coverage.
WS04(1.00m)	Southwest of the existing building, for general coverage.
SA01(1.75m)	Position selected by Ridge Engineers.
SA02(1.00m)	Position selected by Ridge Engineers for general coverage.
FTP01(1.00m)	Position agreed with the university representative, for general coverage.
FTP02(1.30m)	Position agreed with the university representative, for general coverage.
FTP03(1.00m)	Position selected by Ridge Engineers and agreed with the university representative for general coverage.

The percussion liner boreholes, as listed in the table above were typically drilled to depths of between 1.00m and 3.00m in order to determine the shallow ground conditions across the site. These boreholes were targeted to 5.00m depth but refused before this due to the density of the near surface natural soils.

Soil samples were recovered from the exploratory positions for subsequent laboratory testing.

Boreholes WS01, WS02 and WS03 were utilised for the installation of monitoring wells to depths of between 1.00m bgl and 3.00mbgl, comprising c.1.00 - 3.00m of perforated 43mm internal diameter pipe with a screened 3-6mm gravel pack, with c.1.00m of solid pipe at the surface and a wetted bentonite pellet seal.

The wells were sealed with a bung and gas taps and completed at surface with a steel well cover for ease of access and to protect the monitoring well during the monitoring period.

The depths of the exploratory positions, sample details, strata descriptions and comments on the groundwater conditions are detailed on the logs, which are presented in Appendix B along with an Exploratory Point Location Plan.

On site assessment of the arisings was carried out using a PID with a 10.6eV bulb calibrated on 100ppm Isobutylene. This analysis did not indicate any detectable VOCs. Olfactory assessment of the samples recovered indicated no identifiable contamination.

A series of photographs taken during the fieldworks are presented in Appendix B.

5.1 Encountered Strata

The exploratory point arisings were logged by a suitably qualified Geo-Environmental Engineer generally in accordance with BS5930:2015. The mapped geology beneath the site indicated that the subject site was positioned on Kempton Park Gravel overlying the bedrock geology of London Clay Formation, which extend to depth.

The investigation was targeted to 5.00m but all boreholes refused on very dense granular strata but achieved depths of up to 3.00m bgl and confirmed the presence of coarse grained Kempton Park Gravel Member soils underlying the site the full thickness of which was not proven.

A log of the exploratory holes and Exploratory Point Location Plan showing the positions investigated are presented in Appendix B and the soils as found are summarised in the table below:

HARDSTANDING SURFACING

The hardstanding surfacing was encountered as a layer of unreinforced concrete surfacing in location FTP03, extending to 0.20m. At location WS01 tarmac was encountered from surface to 0.05m.

TOPSOIL LIKE MADE GROUND SURFACING

Topsoil Like Made Ground surfacing was encountered as a consistent layer in all locations except FTP03 and WS01 from surface to depths of between 0.15m and 0.30mbgl. The Topsoil was identified as grass onto, dark grey brown sandy slightly gravelly organic CLAY the gravel comprised of fine angular to well rounded, flint, quartzite, brick and concrete with occasional cobbles of bricks and concrete.

The Topsoil Like Made Ground was distinguished with stratigraphic markers of near surface super-position and colour.

MADE GROUND

The Made Ground was encountered in all locations, from surface to depths of 0.20m to 0.70m, locally 1.30m in WS02. The Made Ground was represented by a loose to dense dark brown slightly gravelly slightly clayey SAND with the gravel comprised of fine angular brick, tarmac and limestone or firm dark grey brown sandy organic CLAY.

The Made Ground was distinguished with stratigraphic markers of brick gravel.

KEMPTON PARK GRAVEL MEMBER

The superficial deposits of Kempton Park Gravel Member were encountered underlying the Made Ground in all locations, however, due to the dense nature of these deposits the base was not proven. The Kempton Park Gravel was identified as dense brown sandy GRAVEL, which comprised fine to coarse rounded flint.

It should be appreciated that River Terrace Deposits, such as the Kempton Park Gravel Member, can contain discrete lenses of fine-grained material, which have not been revealed by our exploratory locations.

ROOTS

No obvious tree roots were encountered in any location across the site. However, this is likely due to the small cross sectional area of the exploratory boreholes.

The subject site is occupied by sporadic mature (north and east) and immature trees (south).

The NHBC (2024) Chapter 4.2, Tables 3 and 3a should be referred to with respect to foundation design, when calculating the extent of tree influence. NHBC guidance suggests the mature height should be assumed for all trees over half their mature height. Exact influence distances should be calculated by the design engineer with foundation depths following relevant recommendations in NHBC, CIRIA, ICE and BSI literature.

5.2 Visual Contamination

Evidence of visual and/or olfactory contamination observed within the exploratory positions is summarised below.

Table 5: Summary of visual / olfactory evidence of contamination

Exploratory Location (Depth)	Evidence of Contamination
WS01(3.00m)	Made Ground to 0.20m depth, containing angular limestone. No obvious odours or staining observed.
WS02(3.00m)	Made Ground to 1.30m depth, containing organic material. No obvious odours or staining observed.
WS03(2.00m)	Made Ground to 0.70m depth, containing brick, macadam fragments, limestone. No obvious odours or staining observed.
WS04(1.00m)	Made Ground to 0.50m depth, containing brick, macadam fragments, limestone. No obvious odours or staining observed.
SA01(1.75m)	Topsoil to 0.20m depth, containing brick, concrete. No obvious odours or staining observed.
SA02(1.00m)	Made Ground to 0.50m depth, containing brick, concrete. No obvious odours or staining observed.
FTP01(1.00m)	Made Ground to 0.80m depth, containing brick, concrete. No obvious odours or staining observed.
FTP02(1.30m)	Made Ground to 0.90m depth, containing brick, concrete. No obvious odours or staining observed.
FTP03(1.00m)	Made Ground to 1.00m depth, containing brick, concrete. No obvious odours or staining observed.

5.3 Groundwater Conditions

The following table summarises the depth of groundwater strikes across the site during the drilling and associated standing water levels on completion of the borehole.

Table 6: Water Strike Details

Exploratory Location (Depth)	Water Strike Details
WS01(3.00m)	No Groundwater encountered.
WS02(3.00m)	No Groundwater encountered.
WS03(2.00m)	No Groundwater encountered.
WS04(1.00m)	No Groundwater encountered.
SA01(1.75m)	No Groundwater encountered.
SA02(1.00m)	No Groundwater encountered.
FTP01(1.00m)	No Groundwater encountered.
FTP02(1.30m)	No Groundwater encountered.
FTP03(1.00m)	No Groundwater encountered.

Subsequent groundwater monitoring indicated the following:

Table 7: Water Monitoring Details

Groundwater Level (m bgl) and Monitoring Date	Exploratory Point (Basal Depth)		
	WS01 (3.00m)	WS02 (3.00m)	WS03 (1.77m)
19.08.2024	Could not monitor due to vehicles	Dry	Dry
28.08.2024		Dry	Dry
11.09.2024		Dry	Dry
19.09.2024		Dry	Dry

5.4 Ground Gas Conditions

The above-mentioned PRA concluded a low ground gas risk was posed to the proposed development.

Therefore, monitoring standpipes were installed to allow basic ground gas monitoring to be carried out to confirm the risk posed.

A total of 3no. boreholes, WS01 to WS03, were installed with monitoring wells during the siteworks to allow site coverage and monitoring of the groundwater and ground gas levels.

To date, ground gas monitoring comprising 4no. visits have been carried out on the site during August and September 2024. Results of the monitoring are discussed in section 7.3 below.

5.5 Soil Sampling Strategy

Samples were recovered from each of the exploratory points and from each stratum encountered in suitable containers for contamination analysis.

On site assessment of the arisings was undertaken using a PID with a 10.6eV bulb calibrated on 100ppm isobutylene did not indicate any detectable VOCs. Olfactory assessment of the samples recovered indicated no identifiable contamination.

6.0 CONTAMINATION ASSESSMENT

6.1 Chemical Analysis

A total of 8no. soil samples (7no. Made Ground and 1no. Natural) were sent to an external UKAS/MCERTS accredited laboratory to obtain total soil concentrations for a range of priority contaminants.

As noted previously, this stage of investigation did include limited assessment of the soils beneath the existing concrete slab(s) and it is envisaged that further works will be undertaken at a later date to assess the contaminative status of the soils beneath the slabs, albeit as part of a watching brief.

Olfactory screening on site did not indicate any significant hydrocarbon or other odourous contaminant impact of the soils in any exploratory locations.

The suite of analysis was decided based on consultation of the Contamination Exposure Assessment (CLEA) supporting documents and consideration for the site-specific criteria as set out above.

The suite of testing included:

- Asbestos screen and fibre count quantification where positive, for near surface samples
- Metals and Inorganic compounds
- Polycyclic Aromatic Hydrocarbons (PAH) USPEA Priority 16 Compounds
- Total Petroleum Hydrocarbons (TPH) EC10-EC40 screen

Results of the chemical analysis are presented in Appendix C.

6.2 Human Health Assessment Criteria

The assessment has been carried out in accordance with the Contaminated Land Exposure Assessment (CLEA) methodology as detailed within LCRM 2023. The assessment criteria employed are based on the proposed final farmyard land use of the site. For this site, a worst-case proposed land use of 'Residential without Home Grown Produce' will be employed for all areas of the site.

In March 2014 DEFRA published new guidance detailing the Category 4 Screening Levels (C4SL) system for the classification of contaminated land. The C4SL system was published to assist with revised statutory guidance published in 2012 for Part 2a of the Environmental Protection Act.

It introduces a new four category system for the classification of land under Part 2a where a Significant Possibility of Significant Harm to human health has been concluded. The categories correspond to Category 1 – land where the level of risk is clearly unacceptable, to Category 4 – where the level of risk posed is acceptably low. In short, land that passes the category 4 test "should not be capable of being determined as contaminated land under Part 2a".

Currently no statutory chemical guidance levels for land contamination exist in the UK. Therefore, the reported soil total contaminants concentrations will be compared to In-House Generic Assessment Criteria (GAC) used as C4SLs.

These In-House GACs are presented in Appendix C and are generally based on the LQM/CIEH S4UL values.

The S4UL values employed are based on a Soil Organic Material (SOM) concentration of 2.5% for the initial screening.

A S4UL has not been published for lead. The GAC value employed has been derived using the DEFRA C4SL1 toxicological data and exposure parameters and the CLEA Software V1.071:2015.

The C4SL value employed for the lead GAC, for a residential with plant uptake land use scenario, is based on a blood lead level of 3.5ug/dl for the lower level of toxicological concern employing the Integrated Exposure Uptake Biokinetic model (IEBUK) estimated blood lead concentrations in children and employs the exposure parameters within the DEFRA C4SL report.

A minimal risk approach was employed to derive the S4UL values, whereas the C4SL model uses a lower level for risk model, which is deemed generally less conservative than the minimal risk approach. However, the use of a lower level for risk model screening criteria is considered strongly precautionary and is generally considered appropriate for use within the planning regime.

[1] DEFRA SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Final Project Report (Revision 2) 2014

However, with consideration of the C4SL and S4UL values there still remains some gaps in the available chemical and/or toxicological data for non-priority contaminants and therefore a limited number of previously used CLEA SGVs and ICRCL guideline values have been retained and include those for pH, sulphide, sulphur and water-soluble boron.

Should an exceedance be noted when site priority contaminant concentrations are compared to the employed GACs, site specific assessment criteria can be derived using CLEA software or similar human health risk assessment software. This can also include consideration of bio-availability of the contaminants if required.

Further to the above, samples of Made Ground are generally screened for asbestos presence. Generic assessment criteria do not exist currently for asbestos presence in soil within the UK. Therefore, where asbestos is identified in soil it is recommended that further risk assessment be carried out by suitably qualified and registered persons.

6.3 Groundwater Assessment Criteria

A controlled water risk assessment was outside the scope of this report.

7.0 GENERIC HUMAN HEALTH SITE CONTAMINATION RISK ASSESSMENT

Statistical analysis of the data set is carried out employing the statistical method detailed in CL:AIRE Document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', if exceedances are noted on individual comparison of the contaminant concentrations to the employed assessment criteria, which allows a derivation of a true mean concentration (μ).

The statistical analysis also assesses if the data is normally distributed and considers high levels to determine if they are part of the underlying data set due to 'site wide contamination' or due to contamination 'outliers'.

The statistical analysis derives a 95th percentile upper confidence limit of (μ) for each determinands for comparison to the suitable employed guidance level (GAC) or 'Critical Concentration (Cc)'.

The reported soil sample total contaminant concentrations data set was placed into a single averaging area for assessment. Further to the statistical analysis the chemical results were compared individually to the relevant GACs.

7.1 Total Soil Concentrations – Shallow Soils <1.0m Depth

The priority contaminant concentrations from the 8no. samples of shallow soils analysed, and a summary of the results are presented in Appendix C and are detailed in the following section.

7.2 Heavy Metals

The reported heavy metal concentrations of individual samples within the shallow soils analysed were compared against the Residential without Home Grown Produce GACs employed, all exceedances are summarised in the table below:

Table 8: Heavy Metal Exceedances

Determinand	Assessment Criteria ($mgkg^{-1}$)	Location and Depth (m bgl) (strata)	Maximum Reported Concentration ($mgkg^{-1}$)
Lead	310	FTP02 at 0.50m FTP03 at 0.80m	360
Zinc (phytotoxic)	330	FTP01 at 0.10m	390

Consideration was given to these elevated lead concentrations and their distribution to assess if further risk assessment and possible further analysis, such as bio-accessibility analysis employing the BARGE method, would be suitable. However, given that the elevated sample was near surface Made Ground with no natural soils elevated, it is considered that the elevated lead concentrations are likely anthropogenic and further analysis would not pragmatically reduce the stated risk to the end site users.

Zinc was recorded to be present at concentration elevated compared to the phytotoxicity guidance values employed, exceeding the adopted threshold value of 111 $mgkg^{-1}$. Given this exceedance the Topsoil in the area of FTP01 is unlikely to be suitable for reuse on this site and should be stripped off and replaced with suitable clean soil to reduce phytotoxicity and allow a suitable growth medium.

7.3 Hydrocarbons

The reported hydrocarbon concentrations of individual samples within the shallow soils analysed were compared against the Residential without Home Grown Produce GACs employed, all exceedances are summarised in the table below:

Table 9 Hydrocarbon Exceedances

Determinand	Assessment Criteria ($mgkg^{-1}$)	Location and Depth (m bgl) (strata)	Maximum Reported Concentration ($mgkg^{-1}$)
Benzo(b)fluoranthene	4.00	FTP01 at 0.10m	2.3
Benzo(a)pyrene	3.20	FTP01 at 0.10m	5.6
Dibenzo(a,h)anthracene	0.32	FTP01 at 0.10m	0.88

On site assessment of the arisings was undertaken using a PID with a 10.6eV bulb calibrated prior to use with 100ppm isobutylene did not indicate any detectable VOCs. Olfactory assessment of the samples recovered indicated no identifiable odorous contamination.

The results of the chemical analysis are presented in Appendix C.

7.4 Asbestos

A total of 6no. samples were screened for the presence of asbestos fibres with 3no. samples returning a positive result.

As always on site with historical developments a careful watching brief should be put in place during groundworks for any potential unforeseen pockets of contamination.

Table 10: Summary of Asbestos Identification

Location	Depth (m)	Asbestos detected [Y/N?] - Form	Asbestos quantification [%]
F TP01	0.10	Y – Chrysotile	0.002
F TP02	0.50	Y – Chrysotile	< 0.001
F TP03	0.80-1.00	N	-
SA01	0.10	N	-
SA02	0.40	N	-
WS02	0.10	Y – Chrysotile	0.013

The laboratory testing results are included within Appendix C.

7.5 Controlled Groundwater Risk Assessment

A controlled water risk assessment was outside the scope of this report. However, significant quantities or levels of contamination were not encountered in the shallow soils which suggest that a very low risk is posed to any surface water receptors near the site or controlled aquifer beneath the site.

7.6 Ground Gas Risk Assessment

The PRA report concluded that there was a low to moderate risk of contamination of the site from ground gases. To apply a precautionary approach, monitoring standpipes were installed in boreholes WS01 to WS03 during the fieldworks for the purpose of monitoring ground gas and groundwater levels in order to confirm the risk of ground gases present at the subject site.

7.6.1 Sources

No significant deposits of putrescible organic material or significant depths of Made Ground were encountered in the soils assessed from beneath the site. However, off-site ground gas sources were identified which have the potential to impact the site, albeit at a lower bound risk.

It is considered good practice to assesses the potential risk posed from ground gases migration to the site and accumulating within any enclosed spaces and impact the proposed development and the end users of the site.

Based upon the above discussion, a Low Environmental Risk classification for the generation of carbon dioxide and methane gases and volatiles on site has been concluded for the site in accordance with CIRIA C665 and BS8576:2013.

7.6.2 Pathways

The predominating pathway concluded in the CGM is for the migration of ground gases from any on and off-site potential sources through the shallow superficial geology.

No exploratory excavations encountered ground water during the intrusive works, all monitoring well were dry during subsequent monitoring.

On this basis no retardation of ground gas flow beneath the site is likely to occur due to groundwater. However, there are considered to be feasible potential pathways for gases to migrate onto and around the site.

7.6.3 Receptors

The main receptors of concern are the future site users of the proposed university teaching space on the site through inhalation of asphyxiant gases (CO2) and explosion from flammable gases (CH4) within any new structures.

7.7 Ground Gas Monitoring

Boreholes WS01 to WS03 were utilised for the installation of monitoring wells to depths of between 1.00m bgl and 3.00mbgl, comprising c.1.00 - 2.00m of perforated 43mm internal diameter pipe with a screened 3-6mm gravel pack, with between c.1.00mm of solid pipe at the surface and a wetted bentonite pellet seal. The wells were sealed with a bung and gas taps and completed at surface with a blue coloured solid well pipe upstand for ease of identification during the monitoring period.

An Exploratory Point Location Plan showing the monitoring well locations are presented in Appendix B.

The wells were positioned to give general site coverage for subsequent ground gas and groundwater monitoring. The monitoring was carried out by PGE using a Gas Data GFM436 Gas Analyser and MiniRae PID.

Following BS8576:2013 Section 8.7 and Section 9.4, an initial 4no. ground gas monitoring visits have been carried out on site during August and September 2024. The results of the monitoring are summarised in the table below, with the highest gas level highlighted. The monitoring data is presented in Appendix F.

Table 11: Ground Gas Monitoring Summary

Borehole	Date	GW Level (mbgl)	Atmos. Press. (Mb)	Maximum Methane (% v/v)	Maximum Carbon Dioxide (% v/v)	Lowest Oxygen (% v/v)	Max sustained Flow (l/hr)	VOC
WS02	19/08/24 – 19/09/24	Dry	1006 – 1022	0.1	4.10	17.30	0.00	0.00
WS03		Dry		0.0	3.40	17.50	0.00	0.00
Worst case results				0.1	4.10	17.30	0.10	0.00
GSV score				0.0001	0.0041l/hr	-	-	-
CS Score				**CS1**	**CS1**	-	-	-

The ground gas monitoring on the site indicated low concentrations of methane at a maximum level of 0.01% v/v was identified during a single monitoring visit in WS02.

Carbon dioxide concentrations were also recorded at relatively low concentrations with a maximum level of 4.10% v/v in WS02

A PID was also employed as a basic screening tool to identify potential hydrocarbon / vapour within the boreholes. This did not indicate any significant VOC concentrations.

Sustained gas flows were recorded during the monitoring with a maximum value of 0.0 l/hr identified during the 4no. monitoring visits. Following Section 6.3.4 of BS8485:2015+A1:2019, and Section 9.3.3 of BS8576:2015, 0.1 l/hr will be adopted for calculations.

7.8 Ground Gas Risk Assessment

The proposed development is likely to comprise commercial/industrial style structures and thus based upon BS8485:2015+A1:2019, Table 3, the proposed development would likely be classified as;

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

Where this is the case, the development may be categorised, per Figure 8.1 CIRIA C665 2007, as falling under CIRIA Situation A;

> **Situation A** – Any development other than Situation B, eg factories, shops, commercial, warehouses, schools, cinemas, sports centres, stadiums, high rise housing, housing with basements, etc.

Where the development fulfils these criteria the gas risk for the site may be assessed utilising either the NHBC "Traffic Light System" as outline in NHBC report No 10627-R01(04) / CIRIA C665 or the Characteristic Situation based upon the modified Wilson and Card classification, again as outlined within CIRIA C665.

For the proposed development, the site may be classified as Type B Building and Situation A as the proposed development is indicated to comprise a new teaching space of conventional construction.

Therefore, the results of all the monitoring were assessed in accordance with CIRIA C665 2007 / BS8485:2015+A1:2019 and BS8576:2013.

A maximum methane concentration of 0.10% v/v and carbon dioxide concentration of 4.10% v/v were identified during the monitoring with a maximum sustained gas flow rate of 0.1 l/hr adopted.

The gas monitoring results gave a maximum Gas Screening value of 0.0001l/hr for methane and 0.0041l/hr carbon dioxide.

Based upon the calculated GSVs recorded for the monitoring so far, the site falls into Characteristic Situation 1 (CS1) as per Table 2 within BS 8485:2015+A1:2019.

7.8.1 Ground Gas Protection Measures

For sites classifying as CS1 no gas protection measures are required.

As no significant volatile hydrocarbon impacted soils were observed during the site works and no significant VOCs were recorded during the monitoring, volatile contamination protection measures are also deemed to not be required.

At the time of reporting there are 2no. outstanding rounds of monitoring for this site. PGE will complete the additional monitoring and update this report accordingly.

7.9 Radon

The Envirocheck Report identifies the subject site is located within a lower probability radon area, with <1% of homes estimated to be at or above the action level. The Envirocheck report records, no radon protection measures are necessary in the construction of any new dwellings, buildings or extensions on site. The current requirements of the local authority building control should be confirmed prior to final design and before starting development.

7.10 Ground Gas Risk Assessment Conclusions

Ground gas contaminant monitoring comprising 4no. visits has been carried out on the site during August and September 2024.

The calculated gas screening values are less than 0.07 l/hr for methane and carbon dioxide, which allows a Characteristic Situation 1 as per the modified Wilson and Card classification as outlined in CIRIA C665 2007 / BS8485:2015 or Green as per NHBC traffic light system outlined in NHBC report No 10627-R01(04).

The gas monitoring results gave a worst-case gas screening value of 0.000l/hr for CH4 and 0.0041l/hr CO2. The calculated gas screening values are below the relevant threshold for both methane and carbon dioxide, therefore the site falls within Characteristic Situation 1 (CS1) as per Table 2 within BS 8485:2015+A1:2019.

A minimum of 6 visits over a period of 3 months is recommended for a similar development to that proposed, with at least 2no. at atmospheric pressures below 1000mb as per the CIRIA C665 guidance. To date, 4no. visits have been undertaken during January 2024 with none of the visits at atmospheric pressure of 1000mb. Therefore, it is recommended that the current gas monitoring regime is completed for a total of 6no. monitoring visits.

8.0 SOIL WASTE ASSESSMENT

For the soil waste assessment 2no. composite sample were produced, these sample correspond with WAC1 – shallow Made Ground soils from across the site and WAC2 shallow natural soils from across the site.

Reference should be made to Appendix B for composite sample source location.

The HazWaste online classification system was employed to assess the waste classification employing the total determinand concentrations within samples of the near surface soils, in relation to groundworks arising disposal. This indicated all of the Made Ground and natural soils subjected to testing have a Non-Hazardous classification with EWC code **17 05 04**.

Waste Acceptance Criteria (WAC) testing was also carried out on the composite samples of soils to determine if the soils tested could be disposed of into an inert facility. The testing indicates that the soils tested all had leachable determinands concentrations below the related guidance levels for disposal into an inert facility.

However, asbestos was detected within the WAC1 composite sample. Quantification of asbestos impacted soils was carried out and indicated a maximum concentration of asbestos fibres of 0.013%. This is below the hazardous waste threshold of 0.1% so is not considered hazardous waste, however, this material is unlikely to be accepted into an inert facility.

Soils from WAC2 were free from asbestos and are considered suitable for acceptance into an inert landfill.

The results of the soil waste classification testing are presented in Appendix D.

All waste classification should be confirmed with the waste receiving facility prior to disposal. The waste receiving facility, especially if not specifically an inert landfill, may also require the total soil priority contaminant concentrations which are also presented in Appendix C.

9.0 POTABLE WATER SUPPLY PIPE

Guidance on the type of potable water supply pipe to be employed on residential development sites is given by the UKWIR published guidance document *10/WM/03/21* for the type of potable water supply pipework to be employed for new structures on reused land.

Samples were recovered from shallow depth and suspected pipe burial depths (c. 0.70m – 1.00m depth) on the site. These samples were analysed for a suite of contaminants which are considered to be generally in accordance with the UKWIR *10/WM/03/21* requirements. These samples indicated detectable hydrocarbons within numerous samples of Made Ground.

Therefore, conventional PE pipe may not be suitable for the potable water supply pipework on the site and consideration should be given to the use of barrier pipe in these areas.

The classification will be decided by the local water company and their advice should be sought prior to the laying of any potable water supply pipework. The local water company may require further, more detailed sampling, testing and assessment prior to pipe selection.

All pipework should be laid in corridors of clean soil as best practice.

10.0 SITE CONTAMINATION ASSESSMENT DISCUSSION

Within the 8no. soil samples comprising 7no. samples for full suite of testing, 7no. of Made Ground and 1no. of natural soils tested from across the subject site, lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene concentrations exceedances were recorded within the shallow soils when compared to the employed guidance criteria (GACs) for human health in a Residential without home grown land use scenario.

Asbestos screening was carried out on 7no. samples with chrysotile positively identified in 3no. samples subjected to laboratory screening. Quantification gave results of <0.001% and 0.013%

Zinc was found to be elevated when compared to phytotoxic thresholds in the area FTP01. Therefore, the Topsoil like Made Ground in this area is considered a risk to possible proposed new planting.

An active SPR linkage is considered between these elevated priority determinands in shallow Made ground soils and the end site users through direct contact and ingestion pathways in open soft landscaped areas of the site, as well as to users of adjacent land from wind blown dusts sourced from the site. Further assessment or risk reduction measures are considered necessary with respect to the impacted soils to reduce the risk posed to the end site users.

Gas screening values, based on the 4no. rounds of ground gas monitoring carried out on the site to date, indicate that the site is classified as Characteristic Situation 1 (CS1) as per Table 2 within BS 8485:2015. Therefore, it is considered that no special gas protection measures are required for methane and carbon dioxide for any new developments at the site. However, this should be confirmed with completion of the planned 6no. monitoring visits with some at worst case atmospheric pressure conditions.

Notwithstanding the above assessment, if any unexpected or previously unidentified contamination, notably beneath the existing hardstanding, is discovered during the site development works, a suitably qualified and experienced person should be contacted so any further assessment required can be carried out.

Where the Made Ground soils remain under areas of defined hardstanding such as the footprint of the buildings and communal roads this would effectively break the pathway between the source and the receptors, and the risk posed is considered to be effectively managed.

Notwithstanding the above assessment, if any unexpected or previously unidentified contamination is discovered during the site development works, a suitably qualified and experienced person should be contacted so any further assessment required can be carried out.

10.1 Updated Conceptual Site Model

An assessment of the risk posed by the identified contaminant concentrations has been carried out employing the Source-Pathway-Receptor (S-P-R) methodology detailed within the CLEA methodology. The updated conceptual model set out below reflects the results of the work carried out to date.

Table 12: Updated SPR Flowchart

Potential On-Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete
ONSITE **No significant deposits of Putrescible Made Ground.** **Elevated PAHs compared to Human Health thresholds.** **Elevated Lead compared to Human Health thresholds.** **Elevated Zinc compared to phytotoxic thresholds.**	Dermal/Direct Contact	Current site users (commercial industrial)	No
	Direct Ingestion		No
	Direct Inhalation		No
	Inhalation of Radon Gas		No
	Inhalation of Wind Blown Dust		No
	Vapour Migration		No
	Gas Migration		No
	Dermal/Direct Contact	Future site users (equivalent to residential use without plant uptake)	Yes
	Direct Ingestion		Yes
	Direct Inhalation		Yes
	Inhalation of Radon Gas		No
	Inhalation of Wind Blown Dust		Yes
	Vapour Migration		No
	Ground Gas Migration		No
	Direct Contact	Services (following redevelopment)	No
	Migration of Contaminants – Non-Aqueous Phased		No
	Migration of Contaminants – Aqueous Phased		No
	Dermal/Direct Contact		No

Potential On-Site Contaminant Sources	Potential Pathways	Potential Receptors	Pathway Complete
Ground Gas Risk CS1. Additional monitoring recommended.	Direct Ingestion	Adjacent Properties	No
	Direct Inhalation		No
	Inhalation of Radon Gas		No
Positive asbestos id in samples of Made Ground.	Inhalation of Wind Blown Dust		Yes
	Vapour Migration		No
	Gas Migration		No
Negligible Radon Risk	Inhalation of Wind Blown Dust	Ecological Impacts (including trees)	Yes
	Migration of Contaminants – Non-Aqueous Phased		No
	Migration of Contaminants – Aqueous Phased		No
	Migration of Contaminants from site – Non-Aqueous Phased	Controlled groundwater (Kempton Park Gravel)	No
	Migration of Contaminants from site – Aqueous Phased		No
	Migration of Contaminants – Non-Aqueous Phased	Surface Waters (River Thames)	No
	Migration of Contaminants – Aqueous Phased		No

The risk to construction workers has not been assessed as generally any risks posed to site construction workers from identified contamination can be mitigated through good site practices and robust sitework risk assessment following guidance stated in CIRIA Report 132: 'A Guide for Safe Working on Contaminated Sites' and CIRIA Report C741: 'Environmental Good Practice on Site' during development works. Adequate standard personal protective equipment should be available, and the implementation of basic hygiene measures should be ensured.

Works carried out on sites where asbestos fibres have been identified **must** be carried out by a suitable contractor and a site specific Health and Safety Plan for site construction workers must be produced in line with CAR 2012[2].

11.0 REMEDIAL RECOMMENDATIONS

As stated in the assessment above the following works are required on the subject site to address the risks associated with identified contamination. These recommendations do not constitute a formal Remedial Method Statement (RMS) and are provided as guidance only at this stage.

1. Further assessment of the soils beneath the existing hardstanding either as a watching brief during demolition (or as a second stage on investigation).
2. Removal of physically unsuitable and contamination lead/hydrocarbon impacted Made Ground down to the underlying natural soils in all areas of soft landscaping areas.
3. Ensure any imported Topsoil for soft landscaped areas is clean and certified.
4. Careful watching brief during groundworks for any unforeseen pockets of contamination.

[2] Control of Asbestos Regulations 2012

12.0 FOUNDATION DESIGN CRITERIA

12.1 Geotechnical Laboratory Testing

Representative samples were sent to an external UKAS accredited laboratory following visual assessment and logging of the trial pits and borehole arisings. The testing programme was designed to classify the properties of the encountered soils and to determine the chemistry of the soil in relation to the design of buried concrete.

12.1.1 Atterberg Limits

The results of 5no. Atterberg Limit determinations carried out on samples of the encountered fine-grained soils, are presented in Appendix D. The soils tested have been assessed for their volume change potential (VCP) in accordance with NHBC Standards Chapter 4.2 and are detailed in the table below.

Table 13: Atterberg Limits Testing

Exploratory Point and Strata	Depth (m)	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm	NHBC Modified Plasticity Index	NHBC Volume Change Potential
FTP01 (KPG)	0.90	10.2	21	12	9	67	6	Non-shrinkable
FTP02 (KPG)	1.00	10.1	27	16	11	72	8	Non-shrinkable
SA01 (KPG)	1.10	17.2	35	16	19	84	16	Low
WS01 (KPG)	1.50	7.3	28	15	13	89	12	Low
WS04 (KPG)	0.90	11.1	22	12	10	84	8	Non-shrinkable

Note: KPG – Kempton Park Gravel Member

The samples of finer grained Kempton Park Gravel have Modified Plasticity Indices of 6% to 16% and therefore can be classified as being worst case **Low** Volume Change Potential employing the NHBC classification scheme.

12.1.2 Natural Moisture Content

Testing was performed to determine the natural moisture content (NMC) of the samples subjected to Atterberg Limit testing. These results are presented in the Laboratory Test Result Summaries in Appendix D.

12.1.3 Particle Size Distribution

A total of 1no. Particle Size Distribution (PSD) tests were undertaken within recovered superficial Kempton Park Gravel Member soils, as a composite sample.

The results indicate a fines content of 18%, a sand content of between 59% and a gravel content of between 23% and a cobble content of 0%.

12.1.4 pH and SOx

The level of pH, sulphate and other determinands within the BRE SD1 Suite have been determined for selected samples of soils from above and at possible shallow foundation invert levels and for possible deep pile design, to assess the appropriate Design Sulphate Class for buried concrete in accordance with BRE Special Digest 1 Table 2.

The table below summarises the reported pH values, Total Sulphate and 2:1 Water Soluble Sulphate concentrations.

As of writing, PGE are awaiting outstanding laboratory results to allow BRE SD1 classification of the Made Ground. The report will be updated and reissue upon their receipt.

Table 14: Design Sulphate Class

(Strata) / (Characteristic)	Made Ground/Topsoil	Kempton Park Gravel
pH	7.4	7.3
Total Sulphate (%)	0.14	0.69
Water Soluble Sulphate	Awaited	1730
Appropriate Design Sulphate Class	**Awaited**	**DS-3 / AC-3**

The Design Sulphate Class was relatively consistent beneath the site and with a worst-case Design Sulphate Class of **DS-3** for the soils encountered.

A worst case Aggressive Chemical Environment for Concrete (ACEC) site classification is **AC-3** for the soils, assuming mobile groundwater.

The assessment assumes that all of the Total Sulphate (%) is in a suitable form that following ground disturbance could oxidise.

12.2 In-Situ Testing

Soil strength testing was undertaken in the field employing Standard Penetration Tests (SPT) carried out generally at 1.0m intervals within the percussion liner sampler boreholes.

The SPT 'N' values obtained for the Kempton Park Gravel Member soils ranged between 15 to 50 with a general depth trend of increasing with depth.

The SPT results indicate corresponding soil strengths of between medium dense to very dense.

Hand vanes were not undertaken in granular soil horizons.

13.0 ENGINEERING EVALUATION

13.1 Introduction

The proposed development scheme is understood to comprise the demolition of the existing teaching building and to construct a new teaching space with associated access areas. It is understood that the project is still within the design phase but is likely to be 2-stories high and constructed using conventional techniques.

A proposed development plan is presented within Appendix A.

From a geotechnical viewpoint this is deemed to be a Ground Investigation Report (GIR) as set out in BS EN 1997:2. This report does not constitute a Geotechnical Design Report as defined in section 2.8 of BS EN 1997-1:2004+A1:2013 'Eurocode 7 – Geotechnical Design – Part 1: General Rules' and in particular will exclude assessment of lifetime actions to buildings from geotechnical influences.

13.2 Foundation Design Considerations

The geology beneath the site generally indicated Made Ground overlying Kempton Park Gravel Member the full thickness of which was not proven.

Based on the soils encountered, as detailed in section 5.1 above, our ground model for the site is:

Hardstanding and Topsoil to an average depth of **0.23m (Max 0.30m)**
Kempton Park Gravel Member proven to a depth of **3.00m**
Groundwater monitoring indicated water levels **below 3.00m** depth

The Made Ground was encountered in all locations, from surface to depths of 0.20m to 0.70m, locally 1.30m in WS02. The Made Ground was represented by a loose to dense dark brown slightly gravelly slightly clayey SAND with the gravel comprised of fine angular brick, tarmac and limestone or firm dark grey brown sandy organic CLAY. The Made Ground was distinguished with stratigraphic markers of brick gravel.

The superficial deposits of Kempton Park Gravel Member were encountered underlying the Made Ground in all locations, however, due to the dense nature of these deposits the boreholes refused at shallow than planned depths and the base was not proven.

The Kempton Park Gravel was identified as dense brown sandy GRAVEL, which comprised of fine to coarse rounded flint.

It should be appreciated that River Terrace Deposits, such as the Kempton Park Gravel Member, can contain discrete lenses of fine-grained material, which have not been revealed by our exploratory locations.

The SPT 'N' values obtained for the Kempton Park Gravel Member soils ranged between 15 to 50 with a general depth trend of increasing with depth.

Soil classification testing indicated the Kempton Park Gravel soils to be coarse grained with particle size distribution testing indicating a fines content of less than 35%. However, Atterberg Limit testing indicated these soils where finer grained to have a worst case low volume change potential. Therefore, these soils should be considered for design to have a Low VCP.

13.3 New Structure Foundation Design Criteria

13.3.1 Soil Volume Change Assessment

No arboricultural reports or plans have been provided for the site at the time of writing this report to determine the species and height of trees on site that are potentially within influencing distance of the proposed structures.

The superficial deposits can be classified as being worst case Low Volume Change Potential employing the NHBC classification scheme.

Given the worst case low VCP for the superficial deposits and the potential presence of semi-mature and mature trees nearby the subject site, a detailed assessment should be carried out using the data within this report once a dedicated tree survey has been submitted and a final development plan has been produced by the scheme foundation design Engineer. This will allow a detailed reassessment of the required minimum foundation depths for the proposed development. Given the low volume change soils and trees present around the site area conventional foundation depths may be significant.

13.3.2 Excavations

Excavations should be readily achieved within the near surface soils using conventional plant. All boreholes and trial pits remained stable during drilling. It is anticipated that excavations within the Kempton Park Gravel Member will be stable only in the short term and therefore, shoring should be considered for all excavations. There remains a possibility that inflows of shallow groundwater, during inclement weather will cause over break of excavations.

Groundwater monitoring indicated water levels below 3.00mbgl. As such consideration should be given to dewatering of deep excavations and timing of excavations so that they take place during the drier summer months. Only long term groundwater monitoring will allow for better planning of works.

It should be noted that groundwater tables can fluctuate both seasonally and rapidly during inclement weather. The reviewer should satisfy themselves with the groundwater levels at the time of any construction works.

At no time should any excavations be entered by personnel without correct shoring and only after an assessment of whether the task can be completed without entry to the excavation has been completed.

13.3.3 Ground Floor Slabs

Where fine-grained material is present below proposed floor slabs, then the use of ground bearing floors is not recommended for movement sensitive structures as detailed in Section 5.1 of the NHBC Standards.

13.4 Foundation Options Discussion

Conventional foundations, such as spread and isolated pads, placed into soft and/or variable soils are generally subjected to increased risk of settlement, especially differential settlement. Therefore, it is not recommended that foundations be placed into the shallow Made Ground or Topsoil encountered to a maximum depth of 1.30m on the site.

Conventional spread foundations (strips / pads) are considered suitable across the site, founding within the natural Kempton Park Gravel Member soils, below any Topsoil or Made Ground at a depth of at least 1.00m bgl assuming a worst case Low VCP across the site.

Given the Low VCP of the Kempton Park Gravel Member soils encountered, this depth will also be considerate of restrictive new planting. However, notwithstanding the above, the foundation depth requirement should fully consider a detailed Building Near Trees assessment if it is found that trees are within influencing distance.

The above foundation options and design approaches are subject to detailed Structural Engineer design and regulator agreement.

13.5 Bearing Capacity

Should a conventional spread foundation option be considered viable at a width of 0.60m, then at a minimum depth of 1.00m below reduced or proposed site levels should be adopted whichever gives the deeper foundation. All foundations should be seated into the soils of the Kempton Park Gravel Member. A conservative allowable bearing capacity in the order of **150kPa** could be utilised for conventional foundations, such as pads and strip footings foundation.

These estimates further include a factor of safety of 3 against general shear failure and should keep settlements within tolerable limits.

Excavations for the footings should be inspected by a suitably qualified person to assess the variability of the soils and groundwater conditions. If, following inspection, the soil conditions differ from those identified within this geotechnical appraisal the recommendations may require reassessment. Any roots, organic matter, and in particular, any 'soft/loose' or otherwise unsuitable material encountered at the founding depth should be removed prior to pouring of any concrete.

13.6 Piled Foundations

In the event that assessed minimum foundation depths be too deep for conventional foundations or the bearing capacities derived above not be sufficient for the proposed development then consideration of alternative foundation solutions such as piles may provide the required improvement in bearing capacities.

Piled foundations are likely to provide a satisfactory foundation option for the proposed development with piles extending deeper into the Kempton Park Gravel Member and underlying London Clay Formation.

Where trees are removed, depending upon pile types and design, piles should be sleeved within the zone of potential desiccation to prevent uplift forces whilst the ground recovers soil water deficits to stable moisture contents.

A deep borehole with attendant sampling, testing and supplementary ground investigation report will be required to provide a further range of geotechnical parameters and to assist structural engineer and piling contractor with the piled foundation design. The advice of a specialist piling contractor should be sought who can provide an assessment of the suitability of their piles.

13.7 Sub-Surface Concrete

The Design Sulphate Class was highly variable beneath the site and with a worst-case Design Sulphate Class of **DS-3** for all soils.

A worst case Aggressive Chemical Environment for Concrete (ACEC) site classification is **AC-3** assuming mobile groundwater.

Typically the worst case concrete classification should be selected for a site.

As of writing, PGE are awaiting outstanding laboratory results to allow BRE SD1 classification of the Made Ground. The report will be updated and reissue upon their receipt.

13.8 Surface Water Soakaways and Soil Permeability

Infiltration testing was carried out within 2no. trial pits (SA01 and SA02) following BRE365 methodology to allow an estimated infiltration factor.

The trial pits were formed to depths ranging between 0.60m and 1.10m bgl and filled with between c. 0.40m and 0.65m of water at the base to limit the water used and borehole instability.

A single preliminary cycle was achieved in both trial pits, SA01 and SA02 within the siteworks timescale due to slow infiltration. The results are presented in Appendix D and are summarised in the table below.

Table 15: Infiltration Factors

Trial Pit	Soil Tested	Test Depth (m)	Infiltration Factor (ms^{-1})		
			Cycle 1	Cycle 2	Cycle 3
SA01	KPG	0.60-1.00	5.60×10^{-6}	-	-
SA02	KPG	0.65-1.75	5.73×10^{-6}	-	-

Note:
KPG – Kempton Park Gravel Member

Given the infiltration testing results obtained, it is considered that conventional soakaways may be effective across the site within the deeper Kempton Park Gravel Member superficial strata. However, it is considered that the testing would need to be completed to be compliant with BRE365 with two further testing cycles when access for the required length of time (c. 3 days) is agreed with the site occupiers.

CERTIFICATION

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the future plans for the site and based on a scope of works agreed by the Client and afforded by the agreed budget. No responsibility is accepted for conditions not encountered, which are between exploratory points or outside of the agreed scope of work or if construction is commenced before regulatory approval of designs.

If the future plans for the site are changed, such as the site is developed for a more or less sensitive use, then a different interpretation might be appropriate.

The report has been prepared generally following the guidelines and principles established in the British Standards, BS5930:1999+A2:2010, BS 10175:2011, entitled 'Investigation of Potentially Contaminated Sites – Code of Practice' and the DEFRA/EA Contaminated Land Reports CLR7 and CLR8.

It necessarily relies on the co-operation of other organisations and the free availability of information and total access. No responsibility can, therefore, be accepted for conditions arising from information that was not available to the investigating team as a result of information being withheld or access being denied.

This report may suggest an opinion on a suspected configuration of strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy. Comments on the groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted, however, that groundwater levels might vary due to seasonal or other effects.

It should be noted that this report is based solely on the samples collected in the borehole locations investigated. During the works and following general site clearance, should the sub-soil conditions in other areas of the site appear to be inconsistent with those found in the areas sampled then this geotechnical appraisal and site contamination assessment may need to be reviewed.

This report is prepared and written in the context of the proposals stated in the introduction to this report and it should not be used in a differing context. Furthermore, new information, improved practices and changes in legislation may require an alteration to the report in whole or in part after its submission. Therefore, with any changes in circumstances, or after one year from the date of the report, the report should be referred back to Paddock Geo Engineering Limited for re-assessment (and, if necessary, for an estimate for the cost of such).

REFERENCES

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24) BRE Report BR211 - Radon: Protective measures for new dwellings, November 2007.

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26) Perimeter soil gas emissions criteria and associated management. Industry Guidance v1.01. BIFFA et al. January 2011.

27) Environment Agency, Briefing Note – Monitoring Frequencies and Non-Compliance Recording.

28) LFTGN03. Guidance on the Management of Landfill Gas. Environment Agency. 2003.

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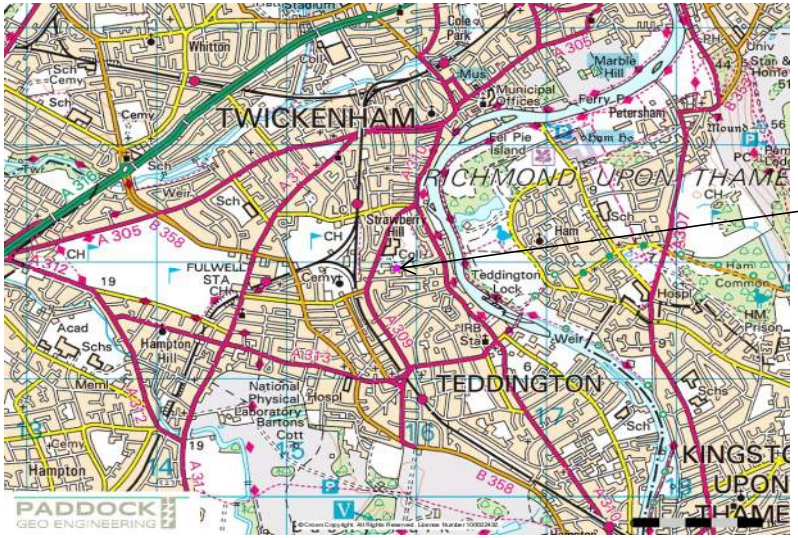
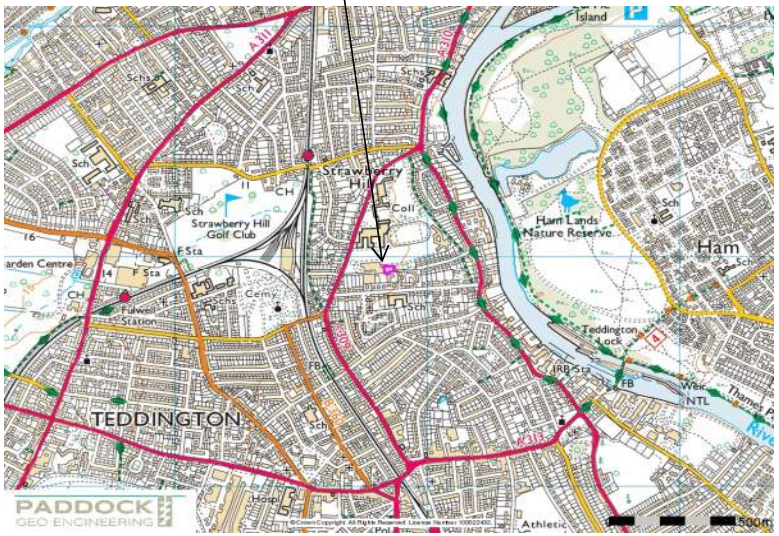
APPENDIX A

Maps Plans and Figures

Site Location Plan
Existing Site Location Plan

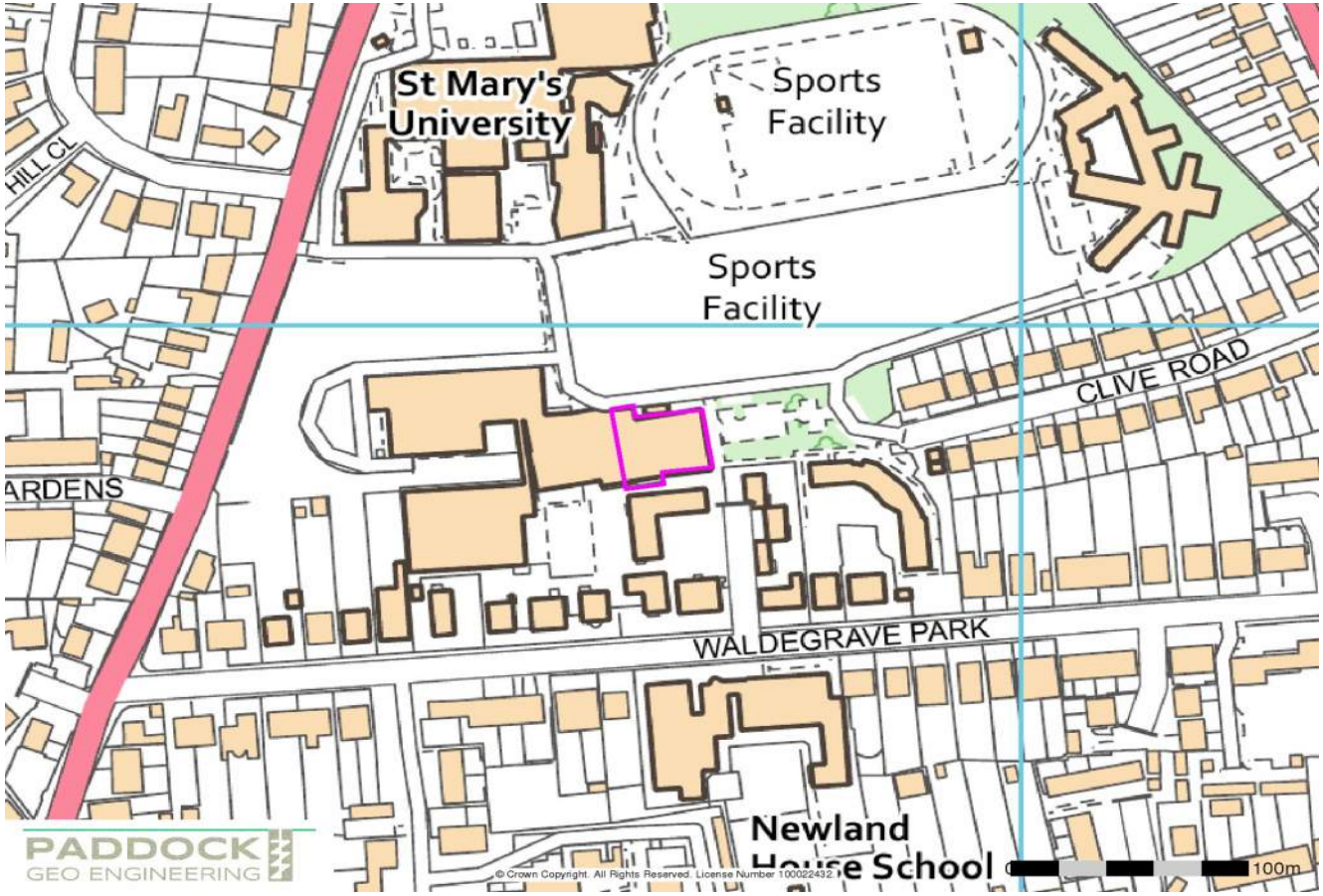
SITE LOCATION PLAN





CLIENT:	St Mary's University
PROJECT No:	P24-234
PROJECT TITLE:	Strawberry Hill Campus, St Mary's University Waldegrave Road,Twickenham, TW1 4SX

SITE PLAN



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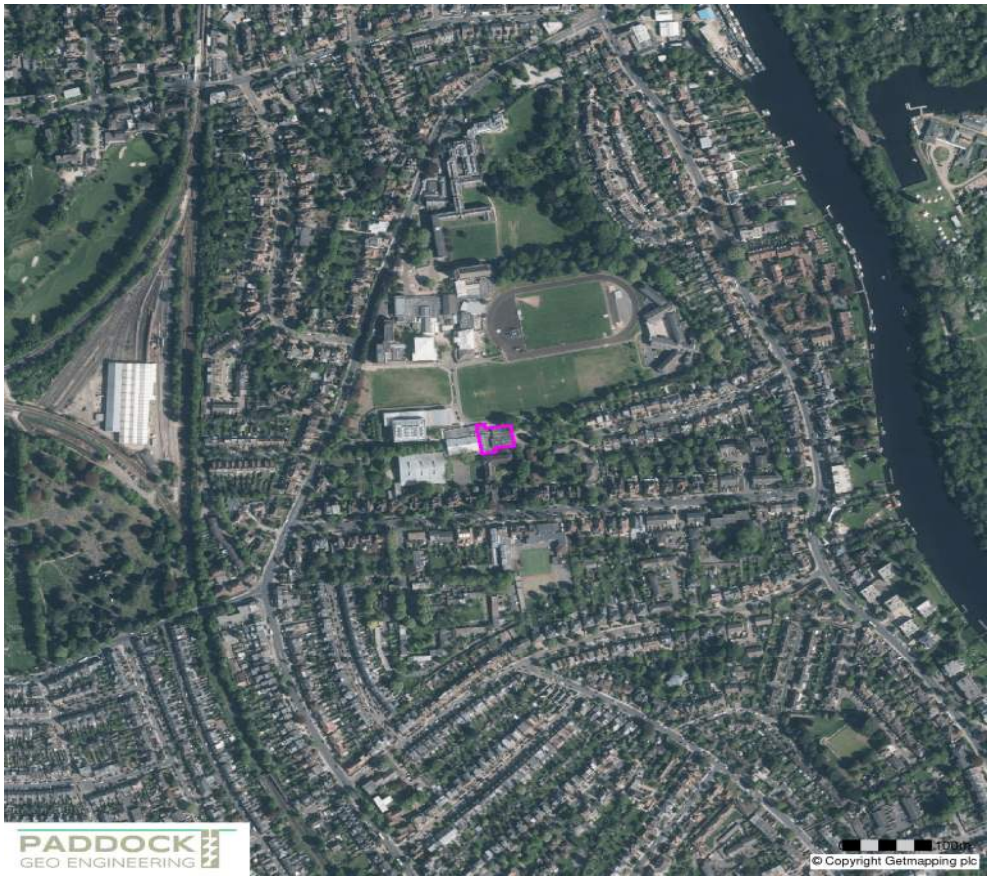
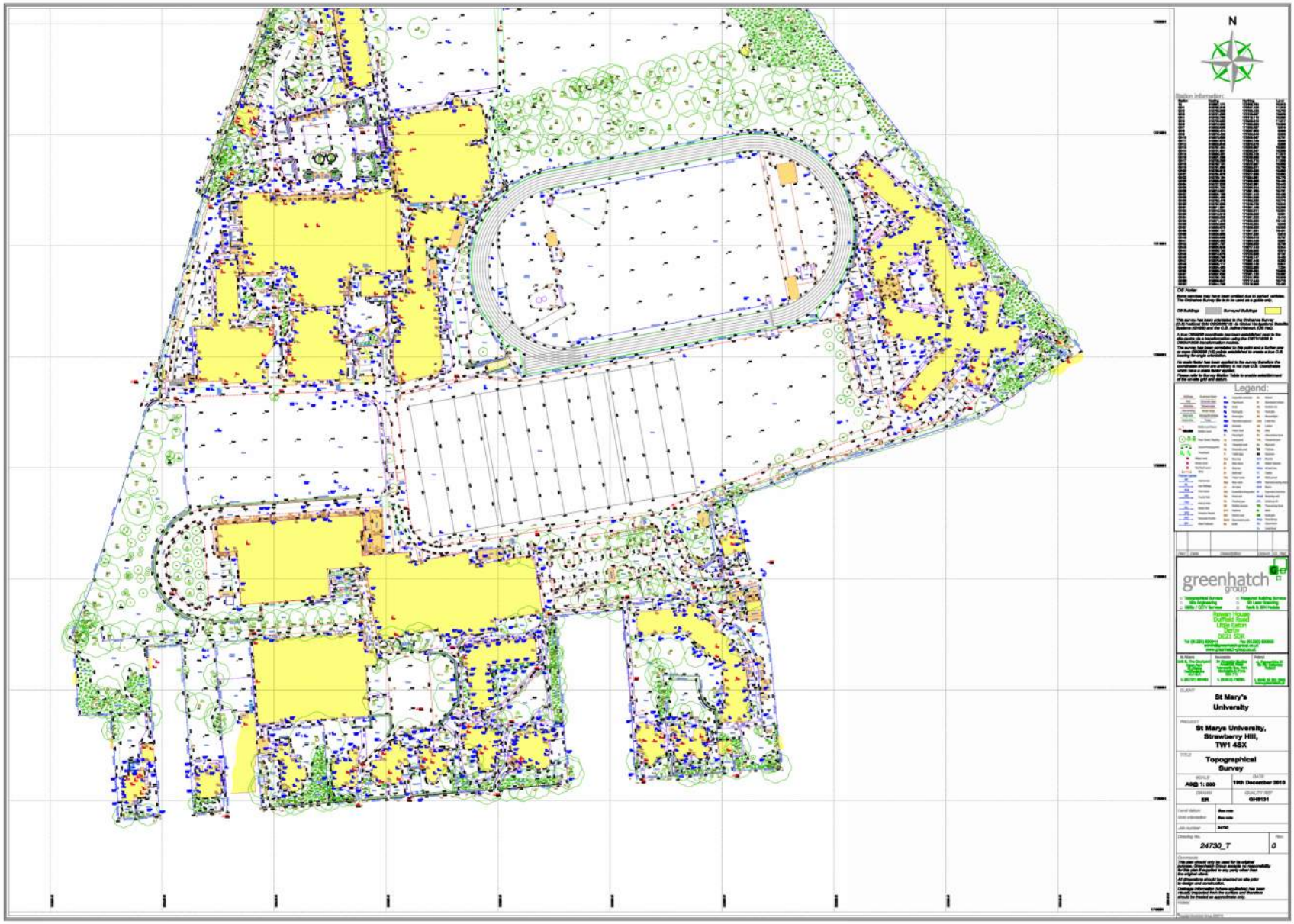
PROJECT No:	P24-234
PROJECT TITLE:	Strawberry Hill Campus, St Mary's University Waldegrave Road,Twickenham, TW1 4SX

AERIAL PHOTOGRAPH



PADDOCK GEO ENGINEERING	**CLIENT:**	St Mary's University
	PROJECT No:	P24-234
	PROJECT TITLE:	Strawberry Hill Campus, St Mary's University Waldegrave Road,Twickenham, TW1 4SX

Main campus_24730_T_UG_REV1.dwg



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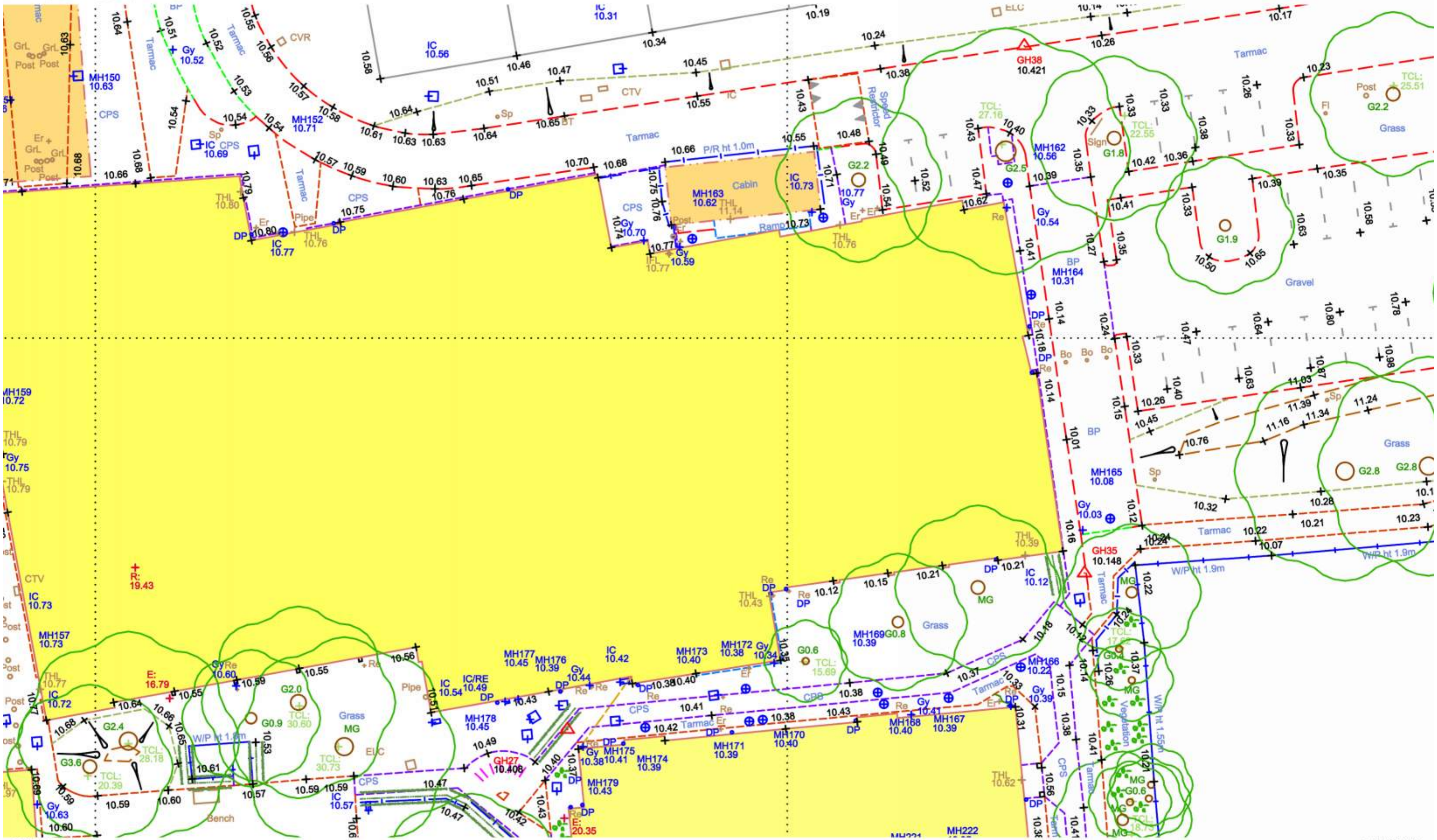


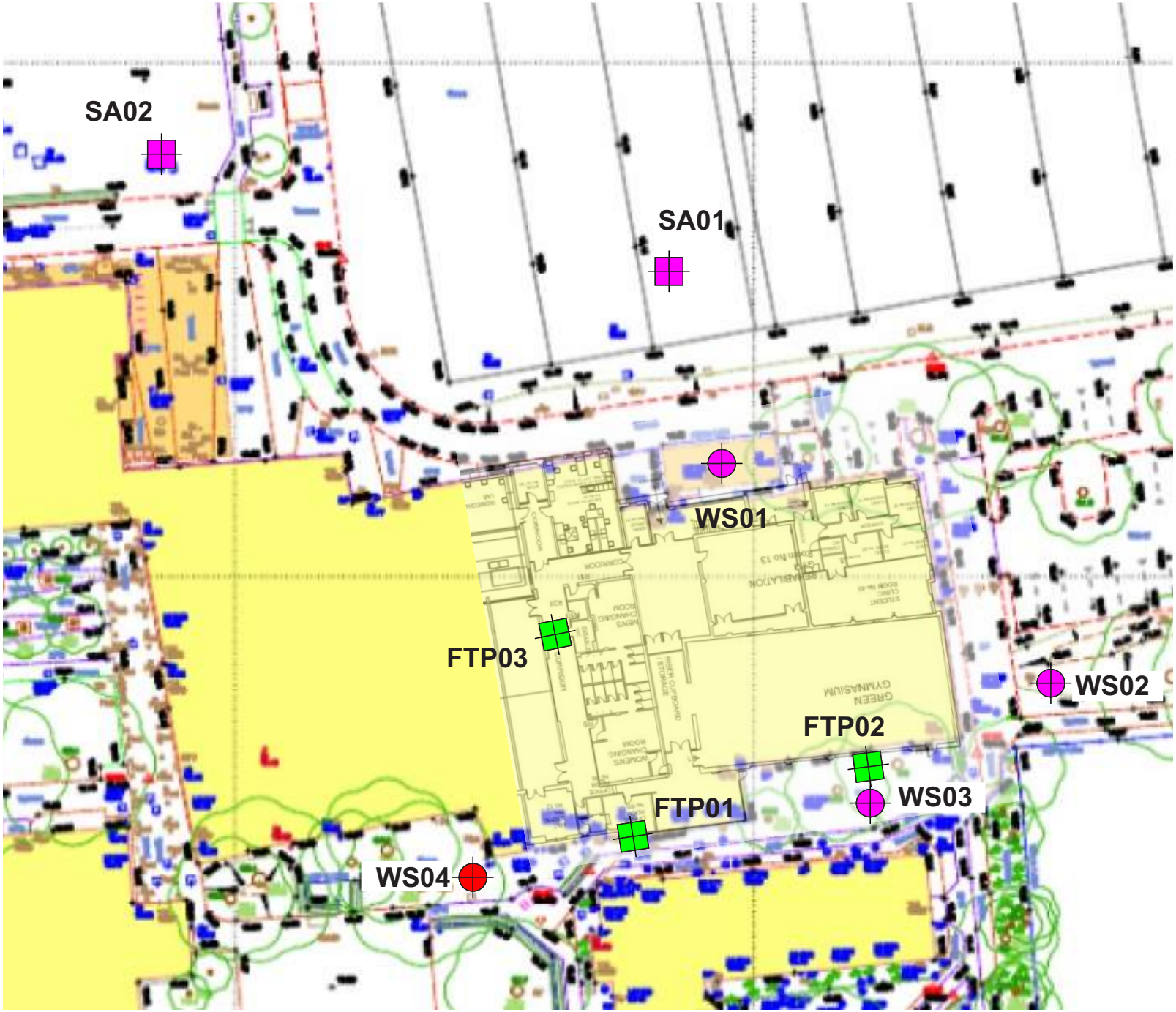
AUTODESK Viewer

AUTODESK

APPENDIX B

Site Details

Exploratory Point Location Plan
Borehole Logs
Trial Pit Logs
Sitework Photographs



PADDOCK GEO ENGINEERING

Exploratory Point Location Plan

Strawberry Hill Campus,
St Mary's University,
Waldegrave Road,
Strawberry Hill,
Twickenham
TW1 4SX

St Mary's University

August 2024

Legend:

- **Percussion Liner Sampling Borehole Locations**
- **Percussion Liner Sampling Borehole Locations (Install)**
- **Foundation Inspection Pit Locations**
- **Infiltration testing Locations**

Notes:

1) Not to scale
2) Dimensions as shown
3) All positions are approximate
4) Drawing to be viewed in colour
5) Drawing to be viewed digitally
6) Not for construction detail
7) Based on plans provided the Client

PADDOCK GEO ENGINEERING

Site	Trial Pit Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	SA01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	1.20m L x 0.30m W		St Mary's University	P24-234
	Location	**Dates** 13/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	C				(0.20) 0.20	Grass onto, dark grey sandy slightly gravelly organic CLAY. Gravel of fine rounded flint, quartzite and occasional brick. (TOPSOIL LIKE MADE GROUND)		
0.60	C				(1.20)	Medium dense dark brown silty SAND. (KEMPTON PARK GRAVEL)		
0.60	D							
1.10	C							
1.10	D							
1.50-1.75	B				1.40 (0.35) 1.75	Medium dense dark yellow brown slightly gravelly SAND. Gravel of fine to coarse sub-rounded flint. (KEMPTON PARK GRAVEL)		
						Complete at 1.75m		

Remarks

Trial pit backfilled with arisings and finished with turf.
No groundwater encountered.
No obvious visual or olfactory evidence of contamination.
Trial pit utilised for infiltration testing.
Trial pit sides remained stable.

Logged in accordance BS5930:2015

Scale (approx)	Logged By	Figure No.
1:40	MG	P24-234.SA01

PADDOCK GEO ENGINEERING

Site	Trial Pit Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	SA02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	1.20m L x 0.30m W		St Mary's University	P24-234
	Location	**Dates** 13/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	C				(0.15) 0.15	Grass onto, dark grey sandy slightly gravelly organic CLAY. Gravel of fine rounded flint, quartzite and occasional brick. (TOPSOIL LIKE MADE GROUND)		
0.40	C				(0.35) 0.50	Dense orange gravelly SAND. Gravel of fine to coarse angular brick, quartzite and flint. (MADE GROUND)		
0.60-1.00 0.70	B C				(0.50) 1.00	Medium dense orange brown slightly gravelly SAND. Gravel of fine sub-rounded flint. (KEMPTON PARK GRAVEL)		
						Complete at 1.00m		

Remarks

Trial pit sides remained stable.
Trial pit utilised for infiltration testing.
No obvious visual or olfactory evidence of contamination.
No groundwater encountered.
Trial pit backfilled with arisings and finished with turf.

Logged in accordance BS5930:2015

Scale (approx)	Logged By	Figure No.
1:40	MG	P24-234.SA02

PADDOCK GEO ENGINEERING

Site	Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	WS01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler	87mm to 1.00m 77mm to 2.00m 67mm to 3.00m		St Mary's University	P24-234
	Location	**Dates** 14/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	C				0.05 (0.15) 0.20	TARMAC Medium dense grey sandy GRAVEL of fine to coarse angular limestone (MADE GROUND)			
0.50	C								
0.50	D				(1.20)	Loose becoming dense brown SAND. (KEMPTON PARK GRAVEL MEMBER)			
0.90	C								
0.90	D								
1.00-1.45	SPT(C) N=15		2,3/3,3,4,5						
					1.40 (0.20) 1.60	Dense brown gravelly SAND. Gravel comprised of fine to coarse rounded flint. (KEMPTON PARK GRAVEL MEMBER)			
1.50	D								
1.60-3.00	B				(0.40)				
					2.00	Dense brown sandy GRAVEL comprised of fine to coarse rounded flint. (KEMPTON PARK GRAVEL MEMBER)			
2.00-2.45	SPT(C) N=27		4,4/7,6,7,7		(1.00)	Medium dense grey SAND with occasional fine flint gravel. (KEMPTON PARK GRAVEL MEMBER)			
					3.00				
3.00-3.45	SPT(C) N=50		6,12/11,14,14,11			Complete at 3.00m			

Remarks
No obvious signs of contamination observed.
Borehole refused on very dense gravel strata.
Monitoring well installed.
No groundwater encountered.
Borehole sides remained stable.

Logged in accordance BS5930:2015

Scale (approx)	Logged By
1:50	MG

Figure No. P24-234.WS01

PADDOCK GEO ENGINEERING

Site	Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	WS02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler	87mm to 1.00m 77mm to 2.00m 67mm to 3.00m		St Mary's University	P24-234
	Location	**Dates** 14/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	C				(0.30) 0.30	Grass onto, dark grey brown sandy slightly gravelly organic CLAY. Gravel comprised of fine angular to well rounded, flint, quartzite, brick and concrete. Occasional cobbles of bricks and concrete. (TOPSOIL LIKE MADE GROUND)			
0.50	C								
0.80	C				(1.00)	Firm dark grey brown sandy organic CLAY. (MADE GROUND)			
1.00-1.45	SPT(C) N=16		2,2/3,4,4,5		1.30				
1.50-2.50	B					Loose becoming dense brown SAND. (KEMPTON PARK GRAVEL MEMBER)			
2.00-2.45	SPT(C) N=16		3,3/3,4,4,5		(1.20)				
2.50-3.00	D				2.50 (0.50)	Medium dense grey SAND with occasional fine flint gravel. (KEMPTON PARK GRAVEL MEMBER)			
3.00-3.45	SPT(C) N=50		9,13/16,15,16,3		3.00	Complete at 3.00m			

Remarks
No obvious signs of contamination observed.
Borehole refused on very dense gravel strata.
Monitoring well installed.
No groundwater encountered.
Borehole sides remained stable.

Logged in accordance BS5930:2015

Scale (approx)	Logged By
1:50	MG

Figure No. P24-234.WS02

PADDOCK GEO ENGINEERING

Site	Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	WS03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler	87mm to 1.00m 77mm to 2.00m 67mm to 3.00m		St Mary's University	P24-234
	Location	**Dates** 14/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.20)				
0.10	C				0.20	Grass onto, dark grey brown sandy slightly gravelly organic CLAY. Gravel comprised of fine angular to well rounded, flint, quartzite, brick and concrete. Occasional cobbles of bricks and concrete. (TOPSOIL LIKE MADE GROUND)			
0.50	C				(0.50)				
0.50	D				0.70				
0.80	C					Dense dark brown slightly gravelly slightly clayey SAND. Gravel comprised of fine angular brick, tarmac and limestone. (MADE GROUND)			
0.90	D								
1.00-1.45	SPT(C) N=40		3,5/8,11,11,10		(0.70)				
					1.40	Loose becoming dense brown SAND. (KEMPTON PARK GRAVEL MEMBER)			
1.50	D				(0.20)				
1.50-2.00	B				1.60	Medium dense grey SAND with occasional fine flint gravel. (KEMPTON PARK GRAVEL MEMBER)			
2.00-2.45	SPT(C) N=50		12,12/14,13,17,6			Complete at 3.00m			

Remarks
Borehole sides remained stable.
No groundwater encountered.
Monitoring well installed.
Borehole refused on very dense gravel strata.
No obvious signs of contamination observed.

Logged in accordance BS5930:2015

Scale (approx)	Logged By
1:50	MG

Figure No. P24-234.WS03

PADDOCK GEO ENGINEERING

Site	Number
Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX	WS04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler	87mm to 1.00m 77mm to 2.00m 67mm to 3.00m		St Mary's University	P24-234
	Location	**Dates** 14/08/2024	**Engineer** PGE	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50 0.10	B C				(0.30) 0.30	Grass onto, dark grey brown sandy slightly gravelly organic CLAY. Gravel comprised of fine angular to well rounded, flint, quartzite, brick and concrete. Occasional cobbles of bricks and concrete. (TOPSOIL LIKE MADE GROUND)		
0.50 0.50-1.00 0.80	C B C				(0.20) 0.50 (0.50)	Firm dark grey brown sandy organic CLAY. (MADE GROUND)		
1.00-1.45	SPT(C) N=50		11,12/16,18,16		1.00	Loose becoming dense brown SAND. (KEMPTON PARK GRAVEL MEMBER)		
						Complete at 3.00m		

Remarks
No obvious signs of contamination observed.
Borehole refused on very dense gravel strata.
Borehole backfilled with arisings.
No groundwater encountered.
Borehole sides remained stable.

Logged in accordance BS5930:2015

Scale (approx)	Logged By
1:50	MG

Figure No. P24-234.WS04

Situated internally at location FTP03 showing corridor.

Situated externally, south of the subject building facing west showing soft landscaping.

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Situated externally, south of the subject building facing west showing soft landscaping.

Situated externally, north of the subject building facing south showing building access and pedestrian fencing storage.

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Situated externally, north of the subject building facing north showing sports pitch and location SA01.

Situated externally, north of the subject building facing south showing the sports pitch and location SA02

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of FTP01

Photo of FTP01 arisings

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of FTP02

Photo of FTP02 arisings

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of SA01

Photo of SA01 arisings

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of WS01

Photo of WS02 arisings

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of WS03

Photo of WS04 arisings

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

Photo of WS04

PADDOCK GEO ENGINEERING

Client:	**St Mary's University**
Project No:	**P24-234**
Project Title:	**Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, TW1 4SX**
Date:	**September 2024**

APPENDIX C

Contamination Assessment

Chemical Analysis Reports
CLEA Analysis Results Summary
PGE In-House GAC's

Paddock Geo Engineering
The Log Cabin
Manor Farm
Whaddon Road
Newton Longville
Milton Keynes
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i2 Analytical Ltd.
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WD18 8YS

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e: reception@i2analytical.com

Analytical Report Number : 24-037850

Project / Site name:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry	**Samples received on:**	16/08/2024
Your job number:	P24-234	**Samples instructed on/ Analysis started on:**	22/08/2024
Your order number:		**Analysis completed by:**	02/09/2024
Report Issue Number:	1	**Report issued on:**	02/09/2024
Samples Analysed:	16 soil samples		

Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Lab Sample Number				294415	294416	294417	294418	294419
Sample Reference				F TP01	F TP01	F TP02	F TP02	F TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.90	0.50	1.00	0.80-3.00
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7	6.1	8.5	5.2	12
Total mass of sample received	kg	0.1	NONE	0.4	0.5	0.5	0.2	0.3
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Detected	-	Detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSO	-	DSO	-	DBU
Actinolite detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Amosite detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Anthophyllite detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Chrysotile detected	Type	N/A	ISO 17025	Detected	-	Detected	-	-
Crocidolite detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Tremolite detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	0.002	-	< 0.001	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	Loose Fibres	-	Loose Fibres	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	9.2	8	8	8	7.2
Total Sulphate as SO_4	mg/kg	50	MCERTS	1400	250	630	150	1800
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	14	-	19	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	7.06	-	9.51	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	4.4	-	2.8	-	2.5
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.33	-	0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.29	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.26	-	0.09	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.3	-	0.07	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.9	-	1.7	-	0.2
Anthracene	mg/kg	0.05	MCERTS	0.94	-	0.33	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	7.6	-	2.9	-	0.5
Pyrene	mg/kg	0.05	MCERTS	7.2	-	2.5	-	0.46
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.5	-	1.4	-	0.26
Chrysene	mg/kg	0.05	MCERTS	4.7	-	1.5	-	0.3
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	6.3	-	2.3	-	0.41
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	2.3	-	0.77	-	0.13
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.6	-	2	-	0.32
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.6	-	1.2	-	0.21
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.88	-	0.27	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.1	-	1.5	-	0.26
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	51.6	-	18.7	-	3.05

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Lab Sample Number				294415	294416	294417	294418	294419
Sample Reference				F TP01	F TP01	F TP02	F TP02	F TP03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.90	0.50	1.00	0.80-3.00
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	-	-	-	-	-
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	-	19	-	12
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.81	-	0.75	-	0.55
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	-	0.6	-	1.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-	-	-
Chromium (III)	mg/kg	1	NONE	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	-	24	-	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	48	-	27	-	21
Lead (aqua regia extractable)	mg/kg	1	MCERTS	160	-	310	-	360
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	-	< 0.3	-	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	-	19	-	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	40	-	47	-	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	390	-	200	-	91
Petroleum Hydrocarbons								
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	180	-	35	-	18

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Ro

Lab Sample Number				294420	294421	294422	294423	294424
Sample Reference				SA01	SA01	SA02	WS01	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.10	0.40	0.90	1.50
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	15	5.3	4.9	5.5
Total mass of sample received	kg	0.1	NONE	0.4	0.3	0.4	0.4	0.3
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	-
Asbestos Analyst ID	N/A	N/A	N/A	DSO	-	DSO	-	-
Actinolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8	8	8.1	8	7.3
Total Sulphate as SO_4	mg/kg	50	MCERTS	430	150	330	1700	6900
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	39	-	-	3500
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	19.6	-	-	1730
Loss on Ignition @ 450°C	%	0.2	MCERTS	4.1	-	2.7	2	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	0.37	-	0.09	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	0.1	-	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	0.6	-	0.21	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	0.6	-	0.22	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.34	-	0.13	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	0.38	-	0.14	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.5	-	0.22	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.16	-	0.1	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.5	-	0.18	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.3	-	0.14	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.34	-	0.13	< 0.05	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	4.18	-	1.57	< 0.80	-

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Roa

Lab Sample Number				294420	294421	294422	294423	294424
Sample Reference				SA01	SA01	SA02	WS01	WS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.10	0.40	0.90	1.50
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	-	-	-	-	-
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.8	-	12	12	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.4	-	0.66	0.52	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	-	0.7	1	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-	-	-
Chromium (III)	mg/kg	1	NONE	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	-	21	17	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	-	21	11	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	53	-	42	15	-
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.3	-	15	12	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	-	38	32	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	39	-	55	39	-
Petroleum Hydrocarbons								
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Roa

Lab Sample Number				294425	294426	294427	294428	294429
Sample Reference				WS02	WS02	WS04	WS03	WAC1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	combined
Depth (m)				0.10	2.50-3.00	0.90	1.50	None Supplied
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	5	2.3	11	6.9	7.9
Total mass of sample received	kg	0.1	NONE	0.3	0.1	0.3	1	1.1
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Detected	-	-	-	Detected
Asbestos Analyst ID	N/A	N/A	N/A	DBU	-	-	-	DSO
Actinolite detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Amosite detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Anthophyllite detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Chrysotile detected	Type	N/A	ISO 17025	Detected	-	-	-	Detected
Crocidolite detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Tremolite detected	Type	N/A	ISO 17025	Not-detected	-	-	-	Not-detected
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	0.013	-	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	Sheeting/Board Debris	-	-	-	Loose Fibres
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	7.4	7.4	7.9	8.2	7.6
Total Sulphate as SO_4	mg/kg	50	MCERTS	540	220	210	150	1300
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	95	19	21	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	47.5	9.47	10.7	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	4.2	-	-	-	3.9
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	0.37
Acenaphthylene	mg/kg	0.05	MCERTS	0.22	-	-	-	0.09
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	0.56
Fluorene	mg/kg	0.05	MCERTS	0.11	-	-	-	0.36
Phenanthrene	mg/kg	0.05	MCERTS	2.5	-	-	-	5.9
Anthracene	mg/kg	0.05	MCERTS	0.28	-	-	-	0.75
Fluoranthene	mg/kg	0.05	MCERTS	4.4	-	-	-	6.6
Pyrene	mg/kg	0.05	MCERTS	3.6	-	-	-	5.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.5	-	-	-	2.7
Chrysene	mg/kg	0.05	MCERTS	2.1	-	-	-	2.9
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.4	-	-	-	3.6
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.1	-	-	-	1.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.1	-	-	-	2.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.2	-	-	-	1.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.27	-	-	-	0.4
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.4	-	-	-	1.7
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	23.2	-	-	-	36.8

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Roa

Lab Sample Number				294425	294426	294427	294428	294429
Sample Reference				WS02	WS02	WS04	WS03	WAC1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	combined
Depth (m)				0.10	2.50-3.00	0.90	1.50	None Supplied
Date Sampled				13/08/2024	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	-	-	-	-	4.2
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	-	-	-	14
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.79	-	-	-	0.77
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	-	-	-	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	-	-	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-	-	-	-	< 1.8
Chromium (III)	mg/kg	1	NONE	-	-	-	-	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	-	-	-	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	-	-	-	32
Lead (aqua regia extractable)	mg/kg	1	MCERTS	200	-	-	-	190
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	380
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	-	-	-	-	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	-	-	-	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	-	-	-	42
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	-	-	-	140
Petroleum Hydrocarbons								
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	35	-	-	-	29

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-037850
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Ro

Lab Sample Number				294430
Sample Reference				WAC2
Sample Number				combined
Depth (m)				None Supplied
Date Sampled				13/08/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	7.9
Total mass of sample received	kg	0.1	NONE	1.1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSO
Actinolite detected	Type	N/A	ISO 17025	-
Amosite detected	Type	N/A	ISO 17025	-
Anthophyllite detected	Type	N/A	ISO 17025	-
Chrysotile detected	Type	N/A	ISO 17025	-
Crocidolite detected	Type	N/A	ISO 17025	-
Tremolite detected	Type	N/A	ISO 17025	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	8
Total Sulphate as SO_4	mg/kg	50	MCERTS	590
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-
Loss on Ignition @ 450°C	%	0.2	MCERTS	2

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.17
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.23
Pyrene	mg/kg	0.05	MCERTS	0.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.1
Chrysene	mg/kg	0.05	MCERTS	0.14
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.12
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.08
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.09
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.22

Analytical Report Number: 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Roa

Lab Sample Number				294430
Sample Reference				WAC2
Sample Number				combined
Depth (m)				None Supplied
Date Sampled				13/08/2024
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**	
Heavy Metals / Metalloids				
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	3
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.67
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (III)	mg/kg	1	NONE	21
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	360
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.96
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	40
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55
Petroleum Hydrocarbons				
TPH (EC10 - EC40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 24-037850
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
294415	F TP01	0.10	162	Loose Fibres	**Chrysotile**	0.002	**0.002**
294417	F TP02	0.50	160	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**
294425	WS02	0.10	193	Sheeting/Board Debris	**Chrysotile**	0.013	**0.013**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
294415	F TP01	None Supplied	0.1	Brown loam and sand with gravel and vegetation
294416	F TP01	None Supplied	0.9	Brown sand with gravel
294417	F TP02	None Supplied	0.5	Brown sand with gravel
294418	F TP02	None Supplied	1	Brown clay and sand with gravel
294419	F TP03	None Supplied	0.80-3.00	Brown loam with gravel
294420	SA01	None Supplied	0.1	Brown loam with vegetation
294421	SA01	None Supplied	1.1	Brown clay and loam with vegetation
294422	SA02	None Supplied	0.4	Brown loam with gravel and vegetation
294423	WS01	None Supplied	0.9	Brown loam
294424	WS01	None Supplied	1.5	Brown loam with gravel
294425	WS02	None Supplied	0.1	Brown loam with gravel and vegetation
294426	WS02	None Supplied	2.50-3.00	Brown sand
294427	WS04	None Supplied	0.9	Brown loam with gravel
294428	WS03	None Supplied	1.5	Brown loam with gravel
294429	WAC1	combined	None Supplied	Brown loam with gravel and vegetation
294430	WAC2	combined	None Supplied	Brown loam with gravel

Analytical Report Number : 24-037850
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES	In-house method	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Loss on ignition of soil @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	In-house method	L047	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088	D/W	MCERTS
Chromium III in soil	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080	W	MCERTS

Analytical Report Number : 24-037850
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-037850

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS01	N/A	S	294423	b	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	b
WS01	N/A	S	294423	b	Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	L076B/L088	b

Human Health Generic Contamination Risk Assessment - Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX (6 Samples)

Determinand	Units	Reported Determinand Range	Assessment Criteria Residential without Home Grown Produce Concentration (cc)	Individual Samples Exceeding Assessment criteria? [Y/N?]	Exceeding Samples
Metals/Metaloids					
Arsenic	mg kg^{-1}	8.8 - 19	40.0		
Berylium	mg kg^{-1}	0.4 - 0.81	1.7		
Cadmium	mg kg^{-1}	0.2 - 0.2	85.0		
Chromium	mg kg^{-1}	12 - 24	910		
Inorganic Mercury	mg kg^{-1}	0.3 - 0.5	56.0		
Nickel	mg kg^{-1}	8.3 - 19	180		
Lead	mg kg^{-1}	42 - 360	310	Y	FTP02 at 0.50m FTP03 at 0.80m
Selenium	mg kg^{-1}	1 - 1	430		
Copper	mg kg^{-1}	15 - 48	7100		
Zinc	mg kg^{-1}	25 - 47	40000		
Vanadium	mg kg^{-1}	39 - 390	1200		
Phytotoxic Metals (Phytotoxicity)					
Copper	mg kg^{-1}	15 - 48	111		
Zinc	mg kg^{-1}	39 - 390	330	Y	FTP01 at 0.10m
Hydrocarbons					
Total Petroleum Hydrocarbons					
TPH EC6-EC10 (PRO)	mg kg^{-1}	N/A	100		
TPH EC10-EC21 (DRO)	mg kg^{-1}	N/A	600		
TPH EC21-EC40 (Min.Oil)	mg kg^{-1}	N/A	1900		
Total TPH	mg kg^{-1}	10 - 180	900		
Poly Aromatic Hydrocarbons					
Benzo(a)anthracene	mg kg^{-1}	0.13 - 4.5	14.00		
Benzo(b)fluoranthene	mg kg^{-1}	0.22 - 6.3	4.00	Y	FTP01 at 0.10m
Benzo(a)pyrene	mg kg^{-1}	0.18 - 5.6	3.20	Y	FTP01 at 0.10m
Napthalene	mg kg^{-1}	0.05 - 0.33	5.60		
Dibenzo(a,h) anthracene	mg kg^{-1}	0.05 - 0.88	0.32	Y	FTP01 at 0.10m
Flourene	mg kg^{-1}	0.05 - 0.3	3800.00		
Phenols	mg kg^{-1}	NE	0.00		
OTHER					
pH	-	7.2 - 9.2	<5, >12		
Sulphur	mg kg^{-1}	N/A	2500		
Water Soluble Boron	mg kg^{-1}	0.5 - 1.9	11000		
Asbestos Screen	Detection	Detected	Not Detected	Y	FTP01 at 0.10m FTP02 at 0.50m WS02 at 0.10m
Asbestos Quantification	%				<0.001 to 0.13

NOTE:

na - Not applicable
ne - Not evaluated, all results below the appropriate guideline level
nc - not displayed as results are not meaningful due to large uncertainty from small data set

GENERIC HUMAN HEALTH SCREENING TOTAL SOIL CONCENTRATION ASSESSMENT CRITERIA (GAC)

DETERMINAND		RESIDENTIAL (mg/kg)		COMMERCIAL (mg/kg)
Chemical	**GAC Sources and units**	**With Home Grown produce**	**Without Home Grown produce**	
Asbestos Screen & ID*	-	Detected	Detected	Detected
Cyanide - Total	SNIFFER	53.25	53.25	53.25
Cyanide - Free	SNIFFER	53.25	53.25	53.25
Loss on Ignition @ 450^{o}C	-	-	-	-
Sulphate (as SO_4) - Total	BRE****	2400	2400	2400
Sulphide	ICRCL	2500	2500	2500
Sulphur - Total	ICRCL	2500	2500	2500
Phenol (Total Monohydric)	CLEA	420	420	3200
pH	ICRCL	<5,>12	<5,>12	-
Metals and Metalloids (CLEA Metals)				
Arsenic	LQM S4UL	37	40	640
Beryllium	LQM S4UL	1.7	1.7	12
Cadmium	LQM S4UL	11	85	190
Chromium III	LQM S4UL	910	910	8600
Lead	DEFRA C4SL	190	310	2300
Mercury (Total)	LQM S4UL (Inorganic)	40	56	1100
Selenium	LQM S4UL	250	430	12000
Copper (phytotoxicity)	LQM S4UL	2400 (111)	7100	68000
Nickel	LQM S4UL	180	180	980
Zinc (phytotoxicity)	LQM S4UL	3700 (330)	40000	730000
Vanadium	LQM S4UL	410	1200	9000
Boron - Water Soluble	LQM S4UL	290	11000	240000
Total Petroleum Hydrocarbons**				
TPH (EC6-EC10) - PRO	LQM S4UL (2.5% SOM)	65	100	4800
TPH (EC10-EC21) - DRO	LQM S4UL (2.5% SOM)	300	600	23000
TPH (EC21-EC40) - Min. Oil	LQM S4UL (2.5% SOM)	1500	1900	28000
Total TPH (EC10-EC40)	LQM S4UL (2.5% SOM)	600	900	23000
Polycyclic Aromatic Hydrocarbons***				
Benzo(a)anthracene	LQM S4UL (2.5% SOM)	11	14	170
Benzo(b)fluoranthene	LQM S4UL (2.5% SOM)	3.3	4	44
Naphthalene	LQM S4UL (2.5% SOM)	5.6	5.6	460
Flourene	LQM S4UL (2.5% SOM)	400	3800	68000
Benzo[a]pyrene	LQM S4UL (2.5% SOM)	2.7	3.2	35
Dibenzo[a,h]anthracene	LQM S4UL (2.5% SOM)	0.28	0.32	3.6

Notes

The Generic Assessment Criteria (GAC) are based on CLEA Soil Guidance Values published values and CIEH/LQM S4CLs where available or ICRCL, DoE, BRE and HSE levels where necessary.
Where gaps remain GACs were calculated using the latest CLEA spreadsheet using DEFRA C4SL toxicology and physiochemical parameters from DEFRA SP1010.

* Guidance level set at any fibre identification.

** TPH 3 band is employed as a screening tool to instigate detailed speciated analysis to the TPHCWG methodology. Based on mean of fractions included

*** Testing based on USEPA Priority 16 compounds. GACs for four compounds and total PAH with published GACs only, used as a screening tool.

**** BRE SD1 - DS-1 Concrete Sulphate Design Class limit. Sulphate is not considered to pose a significant risk to human health under normal circumstances.

PADDOCK GEO ENGINEERING

CLIENT:	St Mary's University
PROJECT No:	P24-234
PROJECT TITLE:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

APPENDIX D

Geotechnical Assessment Data

Geotechnical Laboratory Testing Results
Foundation Sections
Infiltration Testing Sheets

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	28/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

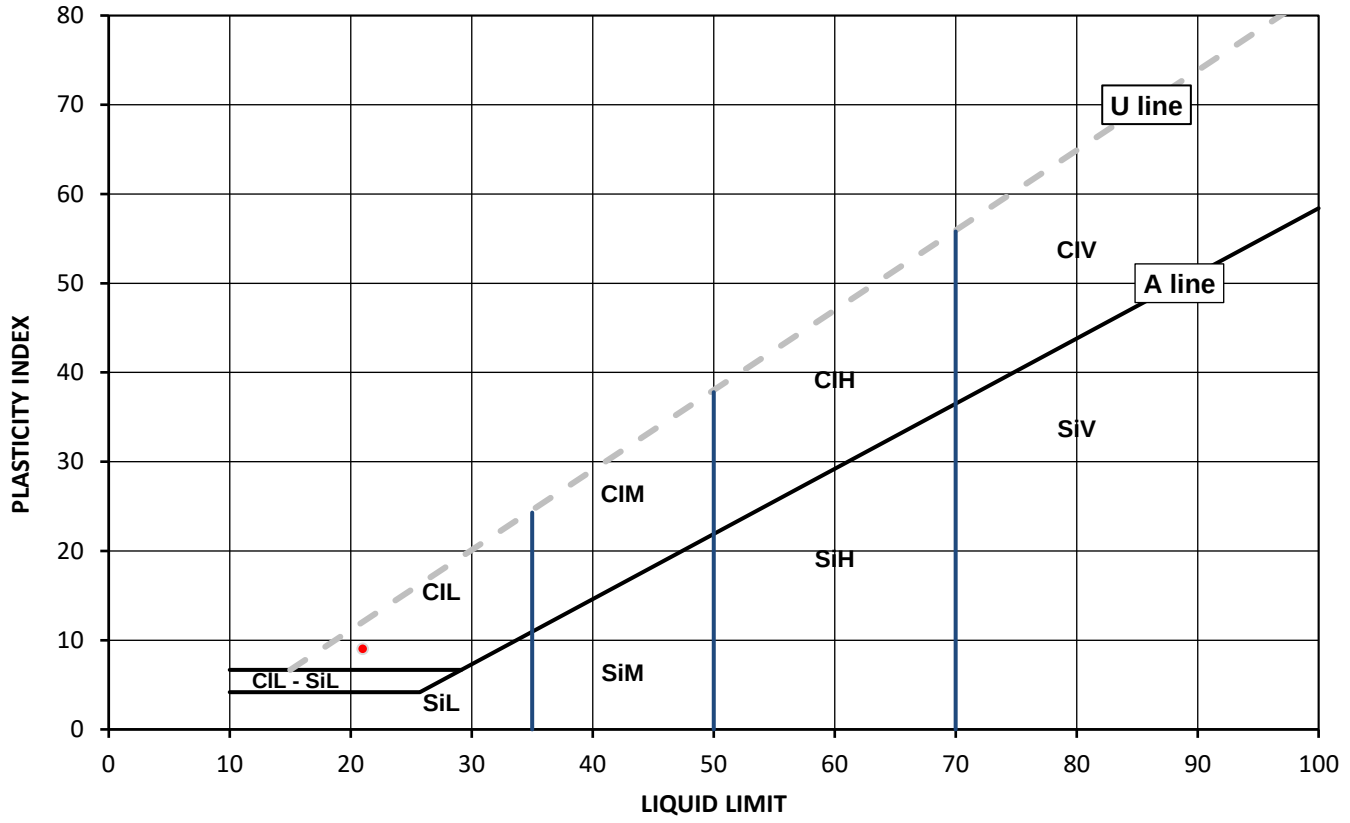
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294409	Depth Top [m]:	0.90
Hole No.:	F TP01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly clayey SAND		

Sample Preparation: Tested after washing to remove >0.425mm; The water content in the sample was increased
Cone Type: 80g/30deg

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
10.2	21	12	9	-0.22	1.22	67



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	28/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

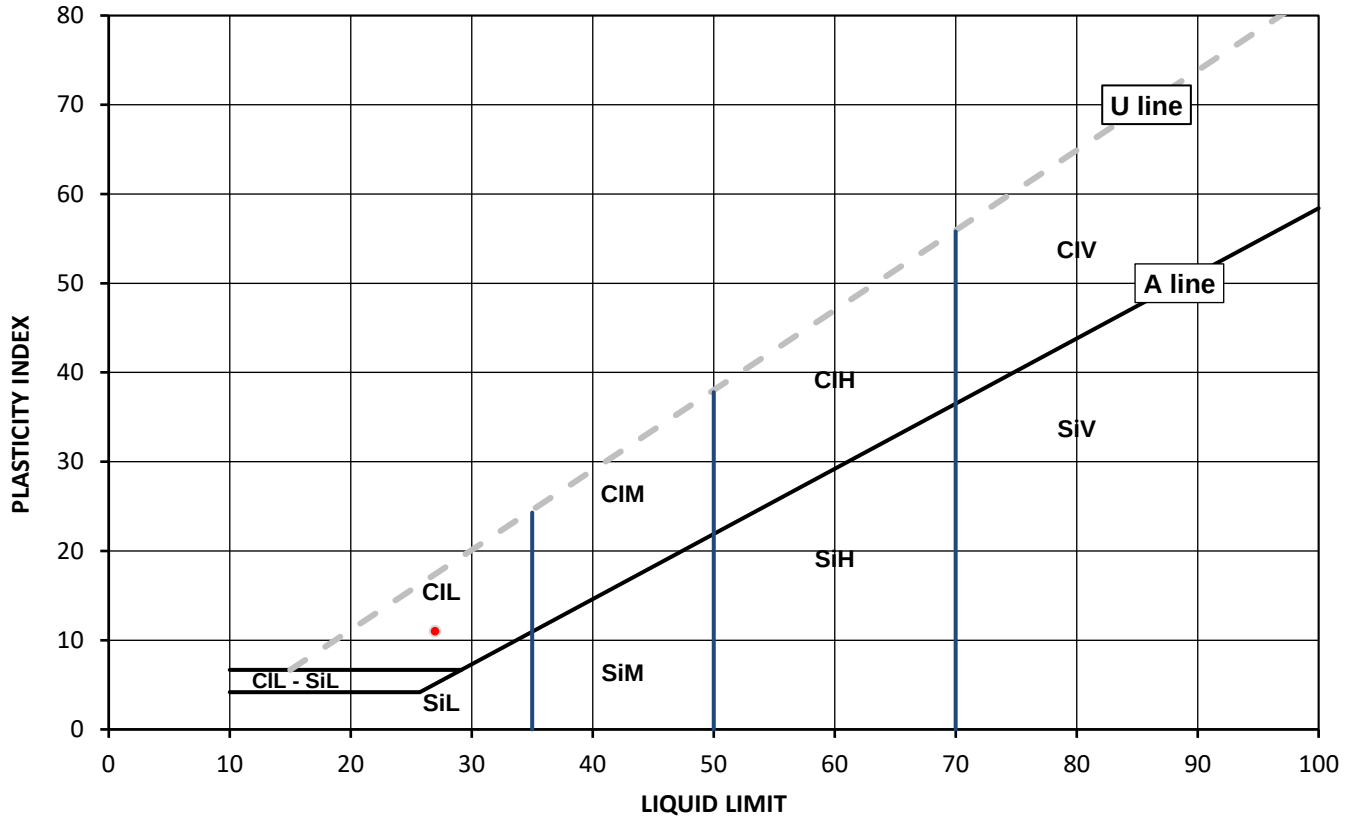
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294410	Depth Top [m]:	1.00
Hole No.:	F TP02	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		

Sample Preparation: Tested after washing to remove >0.425mm; The water content in the sample was increased
Cone Type: 80g/30deg

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
10.1	27	16	11	-0.55	1.55	72



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

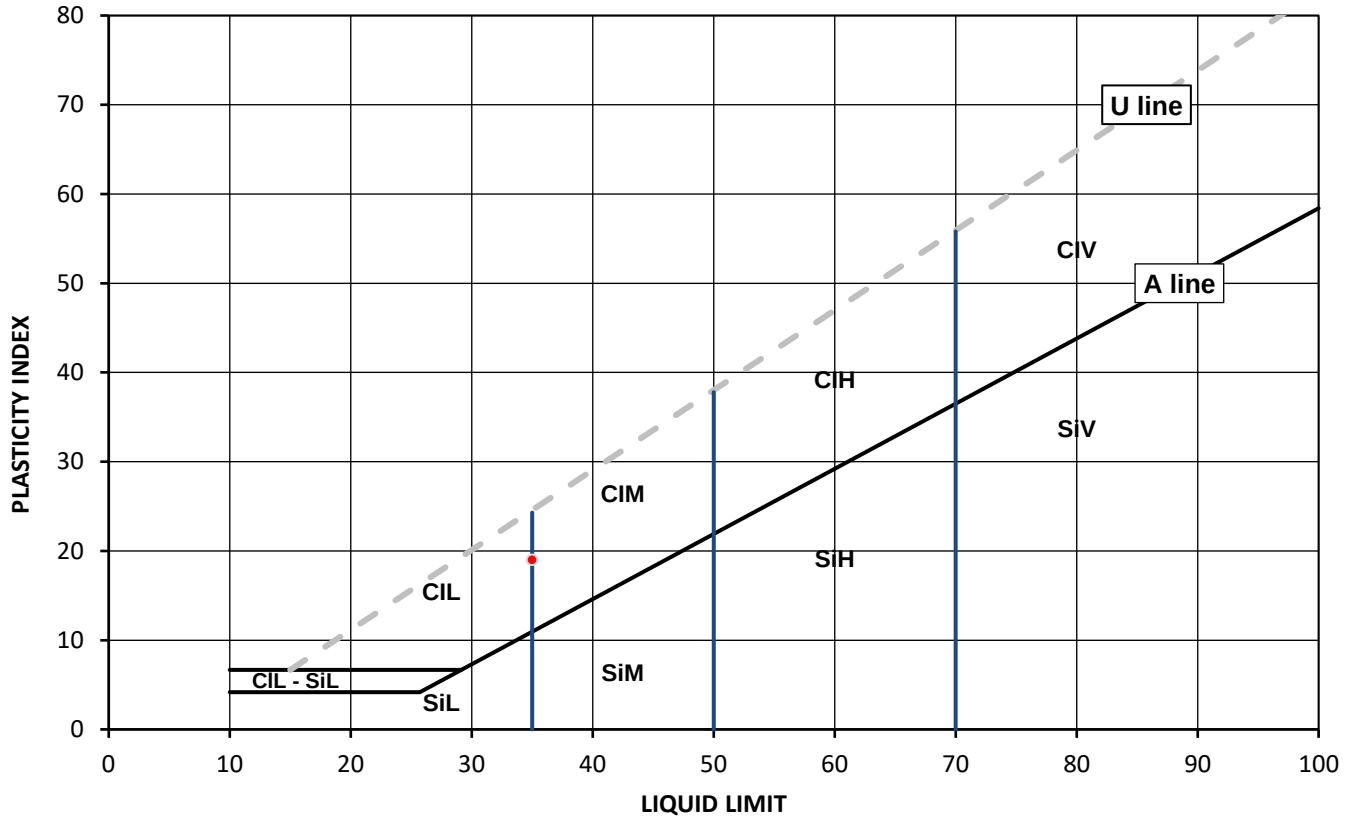
Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	28/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294411	Depth Top [m]:	1.10
Hole No.:	SA01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after >0.425mm removed by hand; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
17.2	35	16	19	0.05	0.95	84



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

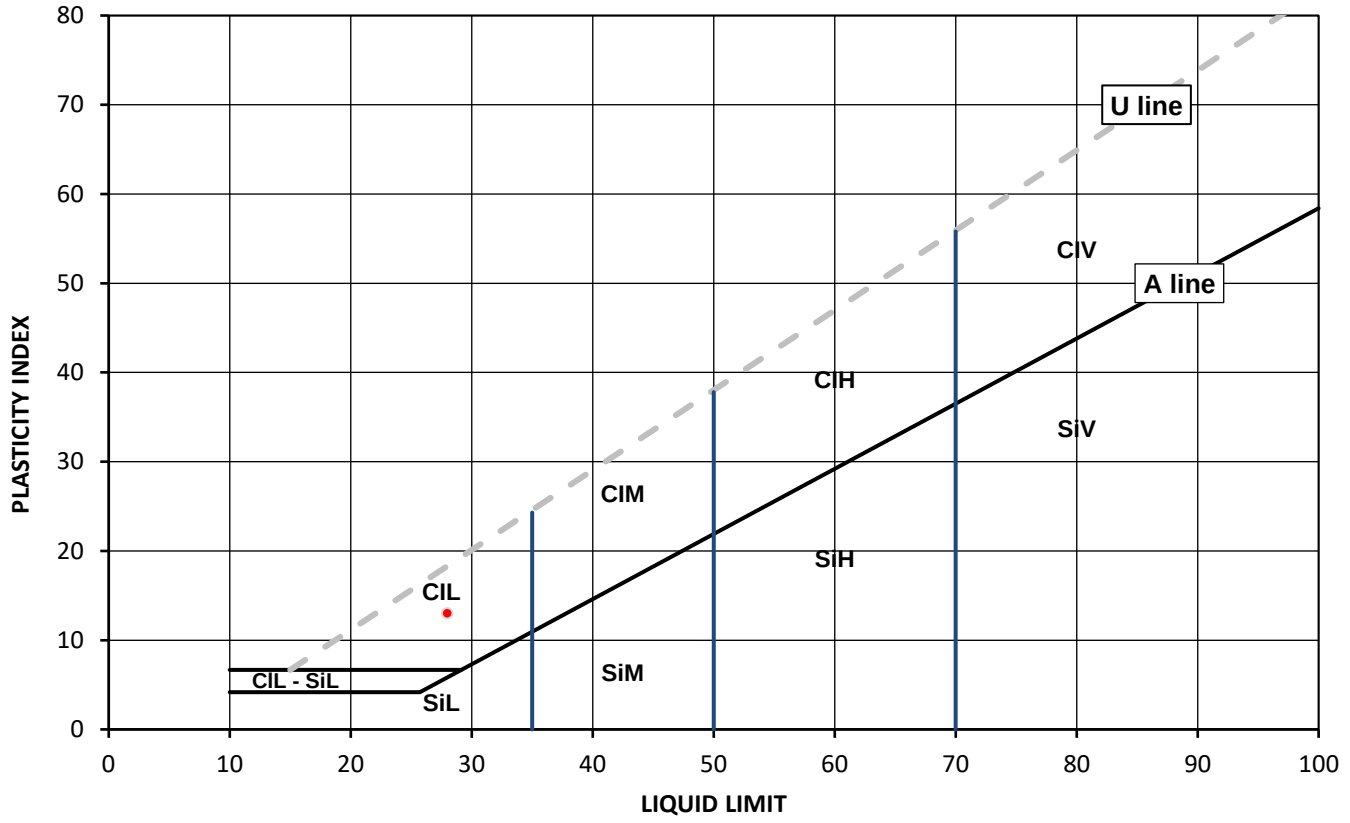
Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	28/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294412	Depth Top [m]:	1.50
Hole No.:	WS01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >0.425mm; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
7.3	28	15	13	-0.62	1.62	89



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 337.13

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

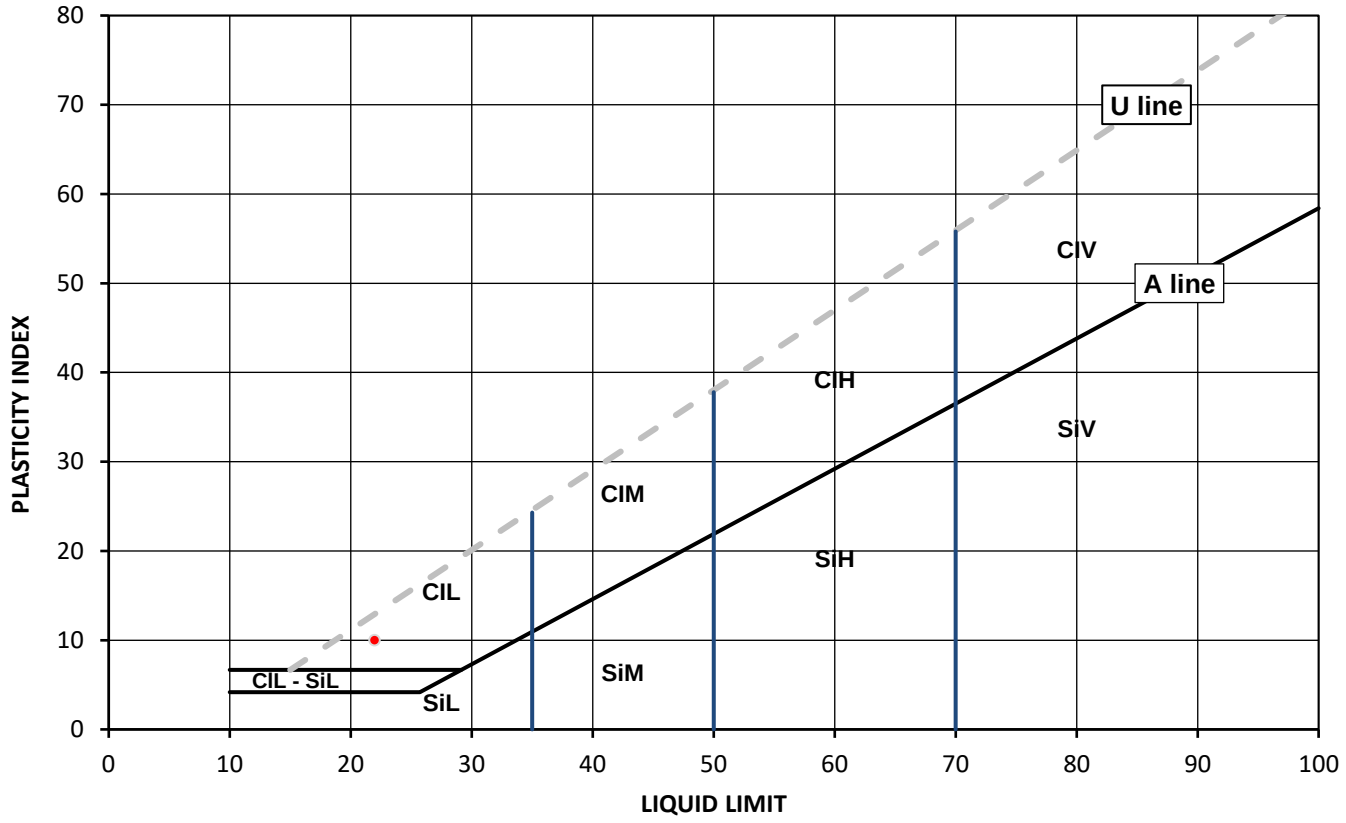
Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	28/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294413	Depth Top [m]:	0.90
Hole No.:	WS04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Light brown slightly gravelly clayey SAND		
Sample Preparation:	Tested after >0.425mm removed by hand; The water content in the sample was increased		
Cone Type:	80g/30deg		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity Index [IL] % #	Consistency Index [IC] % #	% Passing 425µm BS Test Sieve
11.1	22	12	10	-0.10	1.10	84



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS EN 17892-1: 2014; # Non accredited

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 337.13

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

BS EN ISO 17892-12:2018+A2:2022 cl 5.3 and 5.5, Fall Cone Method, 4 Pt Test, BS 1377-2:2022, cl 5.2 and 6. W by BS EN ISO 17892-1:2014+A1:2022.

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Paddock Geo Engineering

Client Address: The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU

Contact: Martin

Site Address: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: P24-234
Job Number: 24-037849-1
Date Sampled: 13/08/2024
Date Received: 16/08/2024
Date Tested: 28/08/2024
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	W	Liquid & Plastic Limit							Density		
		Reference	Depth Top m	Depth Base m	Type			%	% Passing 425um %	WL* %	Correlation Factor	Wp %	Ip %	Cone type	Sample Preparation	bulk Mg/m3	dry Mg/m3	PD Mg/m3
294409	F TP01	Not Given	0.90	Not Given	D	Brown slightly gravelly clayey SAND	Atterberg 4 Point	10.2	67	21	-	12	9	80g/30 deg	W / I			
294410	F TP02	Not Given	1.00	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	10.1	72	27	-	16	11	80g/30 deg	W / I			
294411	SA01	Not Given	1.10	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	17.2	84	35	-	16	19	80g/30 deg	R / I			
294412	WS01	Not Given	1.50	Not Given	B	Brown slightly gravelly very sandy CLAY	Atterberg 4 Point	7.3	89	28	-	15	13	80g/30 deg	W / I			
294413	WS04	Not Given	0.90	Not Given	B	Light brown slightly gravelly clayey SAND	Atterberg 4 Point	11.1	84	22	-	12	10	80g/30 deg	R / I			

Note: # Non accredited; NP - Non plastic; N - Tested in natural condition, R - Tested after >0,425mm removed by hand, W - Tested after washing to remove >425mm; I - The water content in the sample was increased , D - The water content in the sample was decreased; * - One point liquid limit corrected as per the report Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024 **GF 362.15**

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS EN ISO 17892-1:2014+A1:2022, BS 1377-2: 2022, clause 4.1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: Paddock Geo Engineering

Client Address: The Log Cabin, Manor Farm,
Whaddon Road, Newton Longville,
Milton Keynes, MK17 0AU

Contact: Martin

Site Address: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Client Reference: P24-234
Job Number: 24-037849-1
Date Sampled: 13/08/2024
Date Received: 16/08/2024
Date Tested: 28/08/2024
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC											
		Reference	Depth Top m	Depth Base m	Type			%											
294409	F TP01	Not Given	0.90	Not Given	D	Brown slightly gravelly clayey SAND		10.2											
294410	F TP02	Not Given	1.00	Not Given	D	Brown slightly gravelly very sandy CLAY		10.1											
294411	SA01	Not Given	1.10	Not Given	D	Brown slightly gravelly sandy CLAY		17.2											
294412	WS01	Not Given	1.50	Not Given	B	Brown slightly gravelly very sandy CLAY		7.3											
294413	WS04	Not Given	0.90	Not Given	B	Light brown slightly gravelly clayey SAND		11.1											

Comments:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 126.18

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS EN ISO 17892-4:2016, BS 1377-2:2022 cl. 10

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

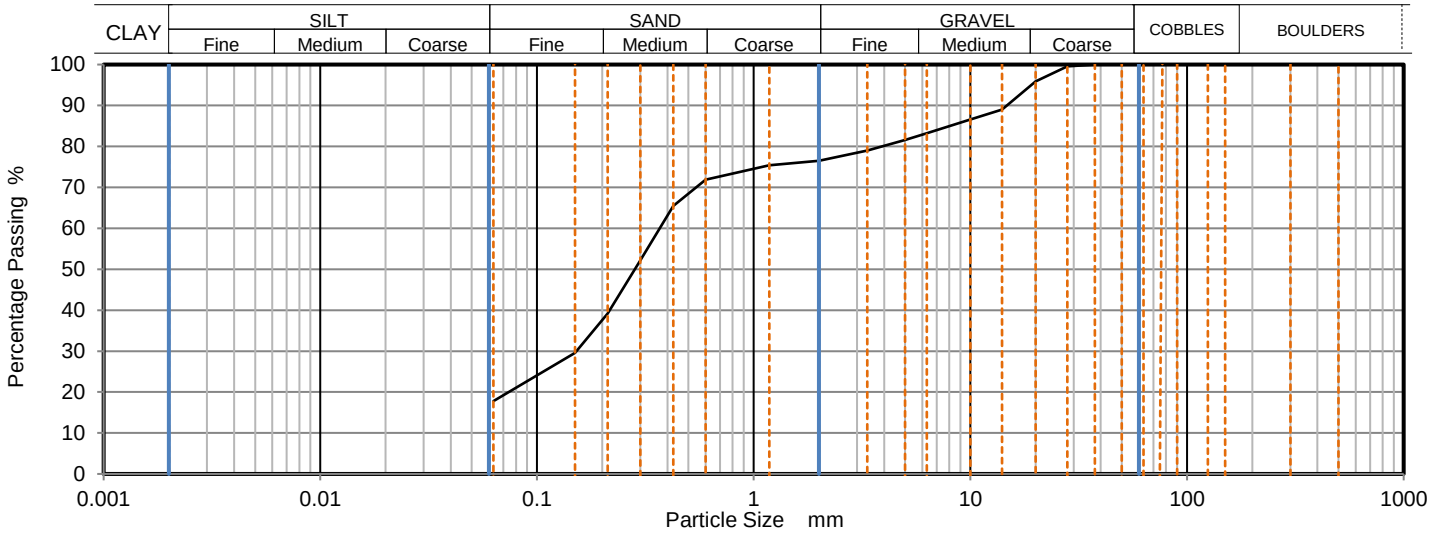
4041

Client:	Paddock Geo Engineering	Client Reference:	P24-234
Client Address:	The Log Cabin, Manor Farm, Whaddon Road, Newton Longville, Milton Keynes, MK17 0AU	Job Number:	24-037849-1
		Date Sampled:	13/08/2024
		Date Received:	16/08/2024
Contact:	Martin	Date Tested:	27/08/2024
Site Address:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	294414	Depth Top [m]:	0.50
Hole No.:	PSD1	Depth Base [m]:	3.00
Sample Reference:	combined	Sample Type:	B
Sample Description:	Yellowish brown very gravelly clayey SAND		
Sample Preparation:	Sample was quartered, oven dried at 107.8 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	89		
10	87		
6.3	83		
5	82		
3.35	79		
2	77		
1.18	75		
0.6	72		
0.425	66		
0.3	52		
0.212	39		
0.15	30		
0.063	18		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	23.00
Sand	59.00
Fines <0.063 mm	18.00

Grading Analysis		
D100	mm	37.5
D60	mm	0.368
D30	mm	0.152
D10	mm	
Uniformity Coefficient		5.8
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with ISO 17892 -4, by sieving on as received or wet sample

Remarks:

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 09/09/2024

GF 366.11

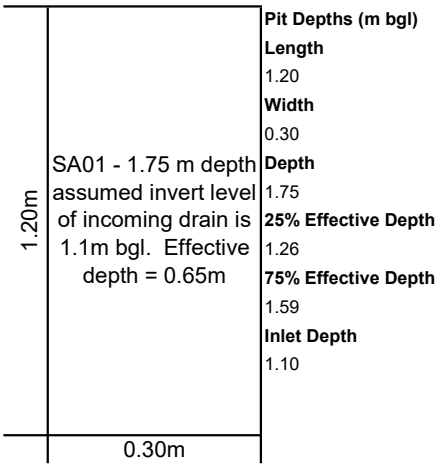
Infiltration Test to BRE365 - SA01 TEST 1

Field Data

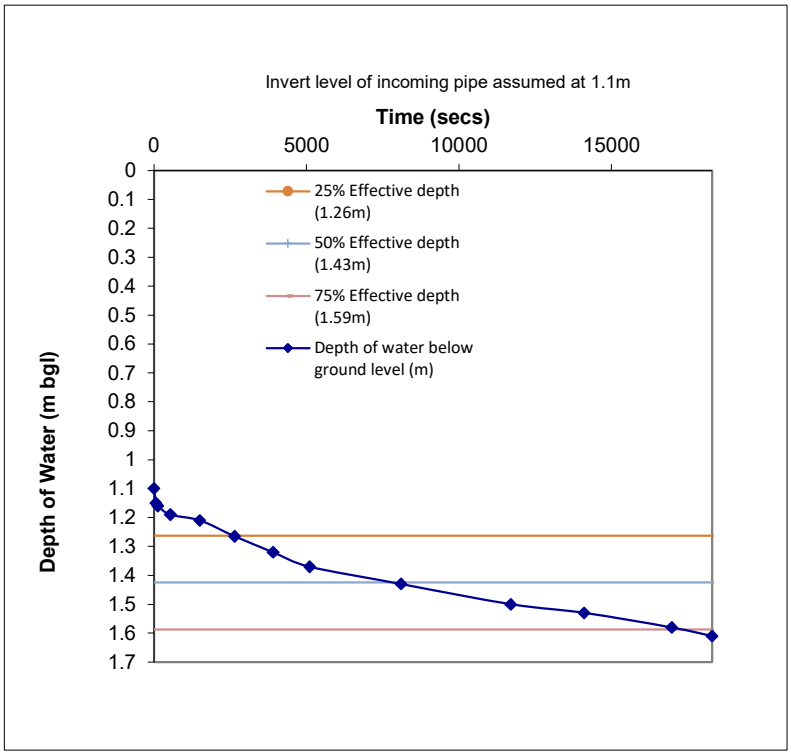
Time	Time Elapsed (min)	Time Elapsed (sec)	Depth of Water below GL (m)
10:33	0.0	0	1.10
10:34	1.0	60	1.15
10:35	2.0	120	1.16
10:42	9.0	540	1.19
10:58	25.0	1500	1.21
	44.0	2640	1.27
11:38	65.0	3900	1.32
11:58	85.0	5100	1.37
12:48	135.0	8100	1.43
13:48	195.0	11700	1.50
14:28	235.0	14100	1.53
15:16	283.0	16980	1.58
15:38	305.0	18300	1.61

Linearly extrapolated results

Location: SA01 **TEST 1**
Weather: Sunny
Engineer: MG
Date: 13/08/2024
Strata Tested: Kempton Park Gravel



Pit Depths (m bgl)	
Length	1.20
Width	0.30
Depth	1.75
25% Effective Depth	1.26
75% Effective Depth	1.59
Inlet Depth	1.10



CALCULATION:

Soil Infiltration Rate(f) =
Vp75-25 / (ap50 x tp75-25)

Where:
Vp75-25 = effective storage volume between 75% and 25% effective depth
1.20x0.3x(1.5875-1.2625)
= **0.117**

ap50 = internal area of TP up to 50% effective depth + base of TP
2(1.20 x) + 2(0.3 x) + (1.20 x 0.3)
= **1.335**

Tp75-25 = the time for water level to fall from 75% - 25% effective depth
= **15660** secs

f= **5.60E-06** m/s

Comment
-

PADDOCK GEO ENGINEERING

Client: St Mary's University
Project No: P24-234
Project: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

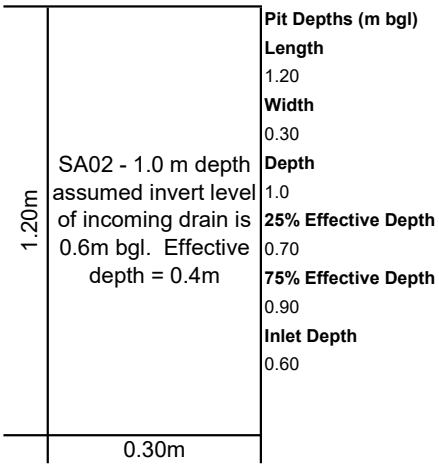
Infiltration Test to BRE365 - SA02 TEST 1

Field Data

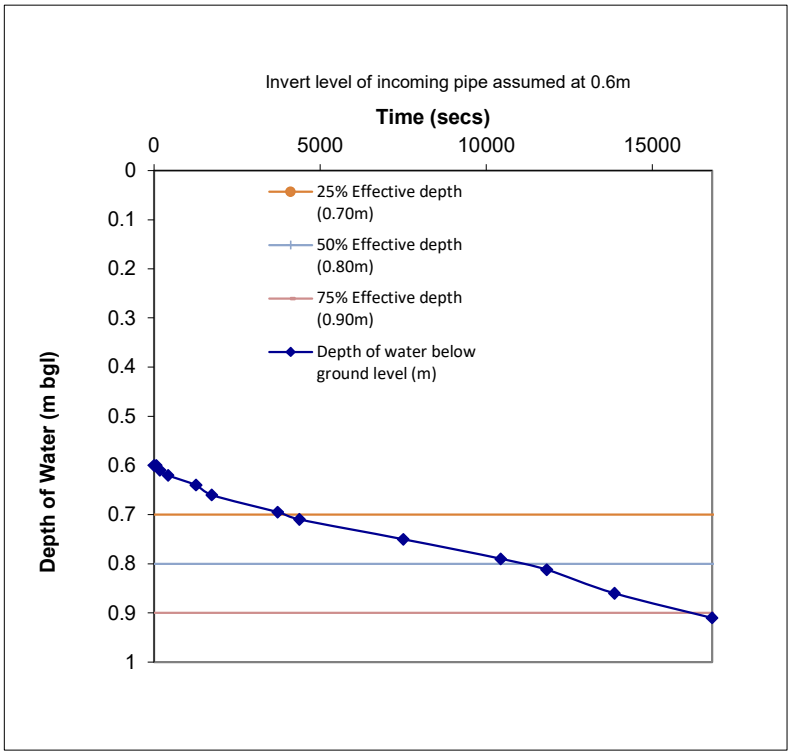
Time	Time Elapsed (min)	Time Elapsed (sec)	Depth of Water below GL (m)
11:35	0.0	0	0.60
11:36	1.0	60	0.60
11:38	3.0	180	0.61
11:42	7.0	420	0.62
11:56	21.0	1260	0.64
12:04	29.0	1740	0.66
	62.0	3720	0.70
12:48	73.0	4380	0.71
13:40	125.0	7500	0.75
14:29	174.0	10440	0.79
14:52	197.0	11820	0.81
15:26	231.0	13860	0.86
16:15	280.0	16800	0.91

Linearly extrapolated results

Location: SA02 **TEST 1**
Weather: Sunny
Engineer: MG
Date: 13/08/2024
Strata Tested: Kempton Park Gravel



Pit Depths (m bgl)	
Length	1.20
Width	0.30
Depth	1.0
25% Effective Depth	0.70
75% Effective Depth	0.90
Inlet Depth	0.60



CALCULATION:

Soil Infiltration Rate(f) =
Vp75-25 / (ap50 x tp75-25)

Where:
Vp75-25 = effective storage volume between 75% and 25% effective depth
1.20x0.3x(0.9-0.7)
= **0.072**

ap50 = internal area of TP up to 50% effective depth + base of TP
2(1.20 x) + 2(0.3 x) + (1.20 x 0.3)
= **0.96**

Tp75-25 = the time for water level to fall from 75% - 25% effective depth
= **13080** secs

f= **5.73E-06** m/s

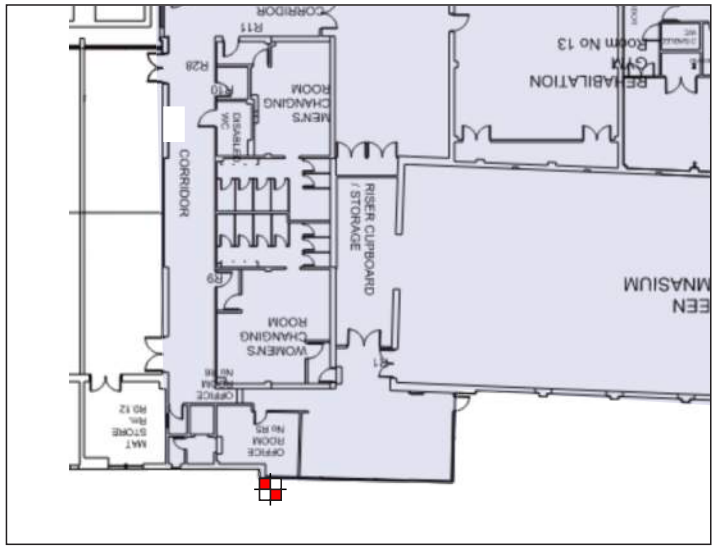
Comment
-

PADDOCK GEO ENGINEERING

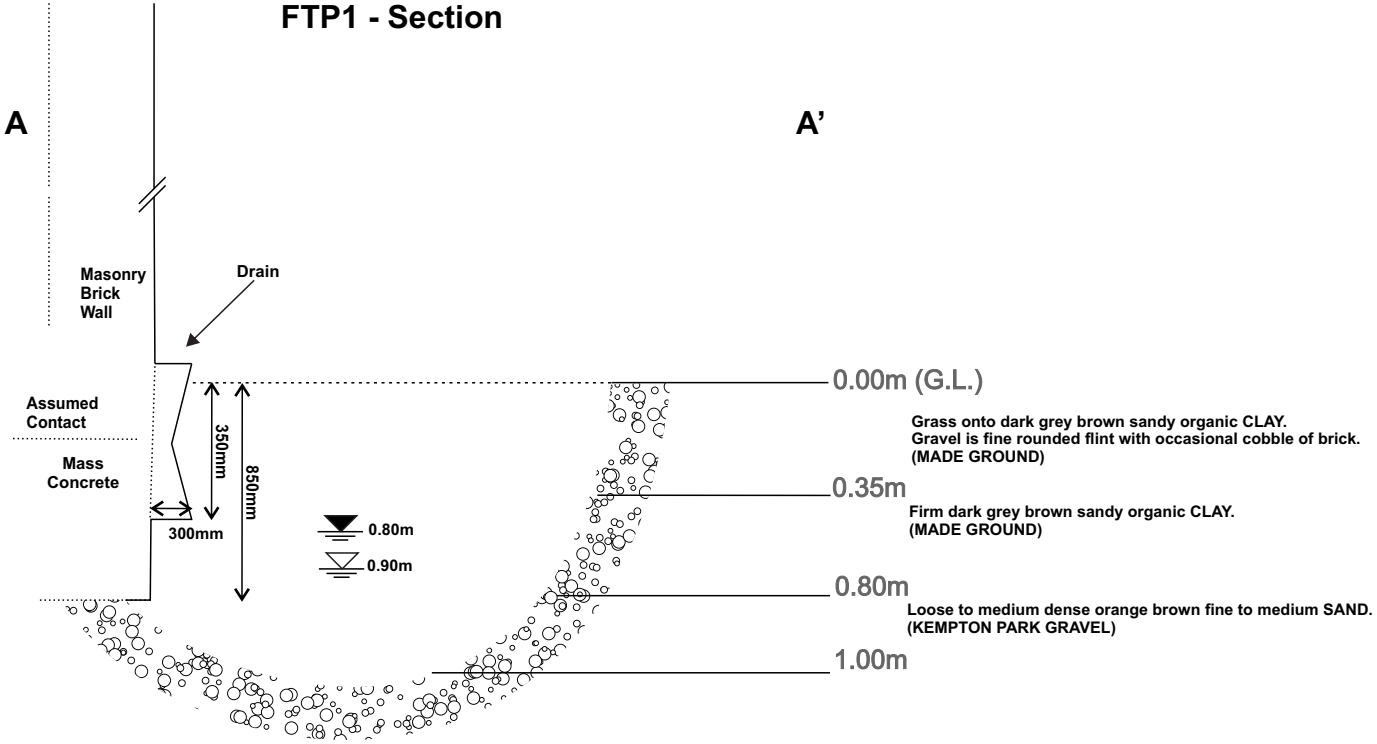
Client: St Mary's University
Project No: P24-234
Project: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

FTP1 - Photo and section line

FTP1 - Excavation Location



FTP1 - Section



PADDOCK GEO ENGINEERING

Foundation Trial Pit (FTP1) Section

Strawberry Hill Campus,
St Mary's University
Waldegrave Road,
Strawberry Hill,
Twickenham
TW1 4SX

St Mary's University

August 2024

Legend:

Foundation Inspection Trial Pit (FTP)

Trial pit details:
Samples:
C - 0.10m
C/D - 0.50m
C/D - 0.90m

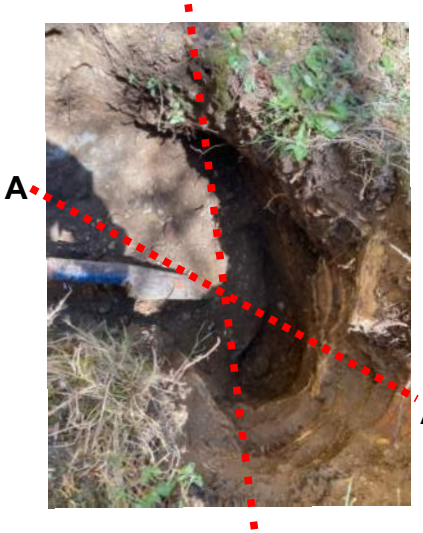
Hand Shear Vane
No suitable soil for testing

Groundwater:
No groundwater encountered

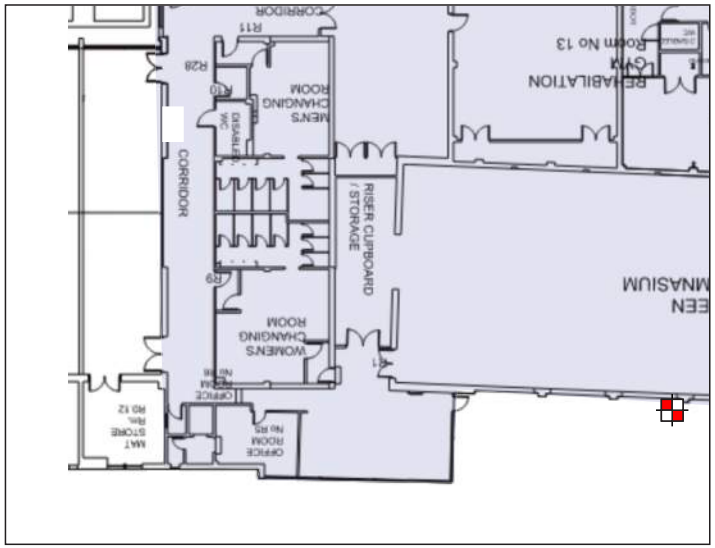
Excavation Remarks:
Sides stable
No obvious contamination
No significant routes
Backfilled with arisings

Notes:
1) Not to scale
2) Dimensions as shown
3) All positions are approximate
4) Drawing to be viewed in colour
5) Drawing to be viewed digitally
6) Not for construction detail
7) Based on plans provided the Client

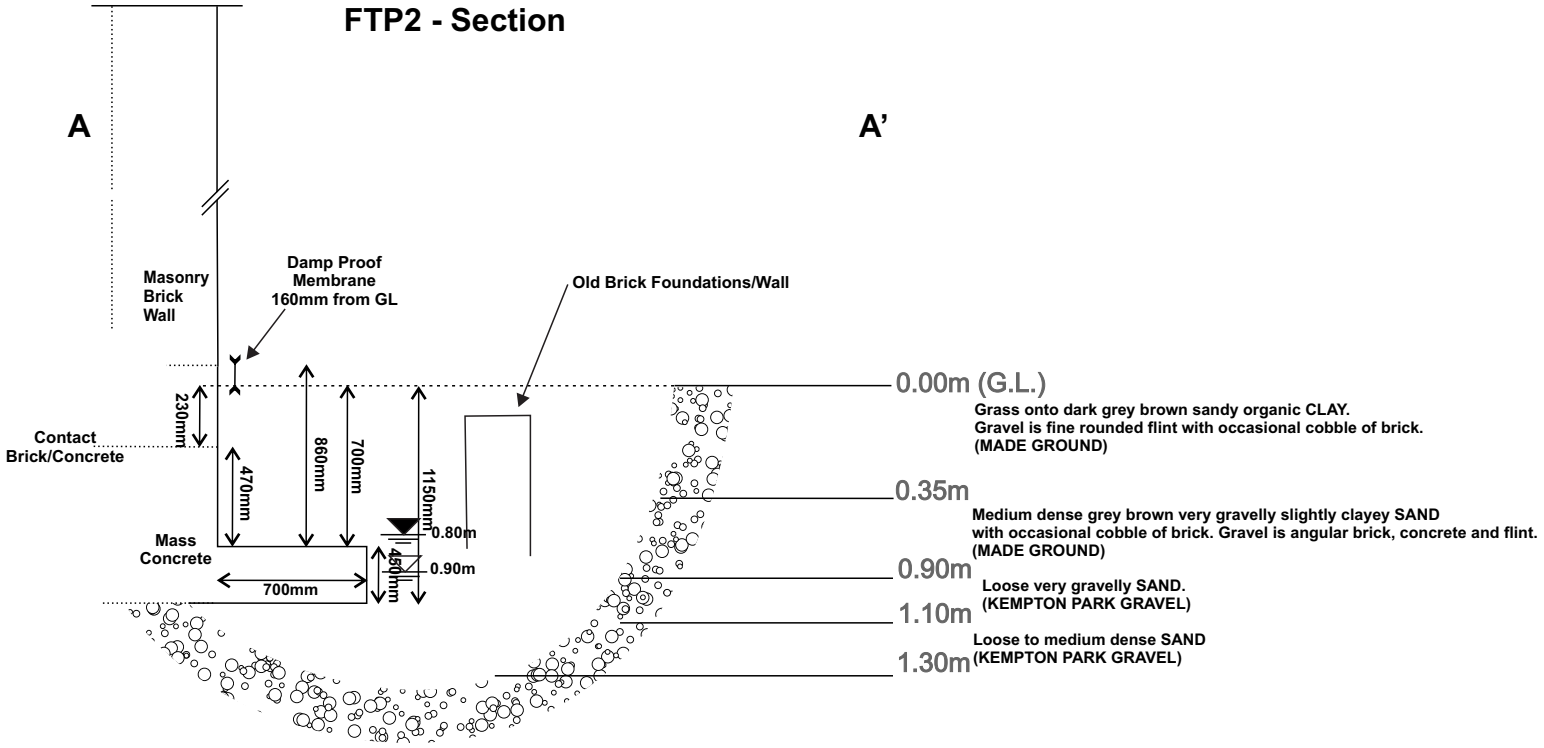
FTP2 - Photo and section line



FTP2 - Excavation Location



FTP2 - Section



PADDOCK GEO ENGINEERING

Foundation Trial Pit (FTP2) Section

Strawberry Hill Campus,
St Mary's University
Waldegrave Road,
Strawberry Hill,
Twickenham
TW1 4SX

St Mary's University

August 2024

Legend:

Foundation Inspection Trial Pit (FTP)

Trial pit details:

Samples:
C - 0.10m
C/D - 0.50m
C/D - 1.00m
D - 1.30m

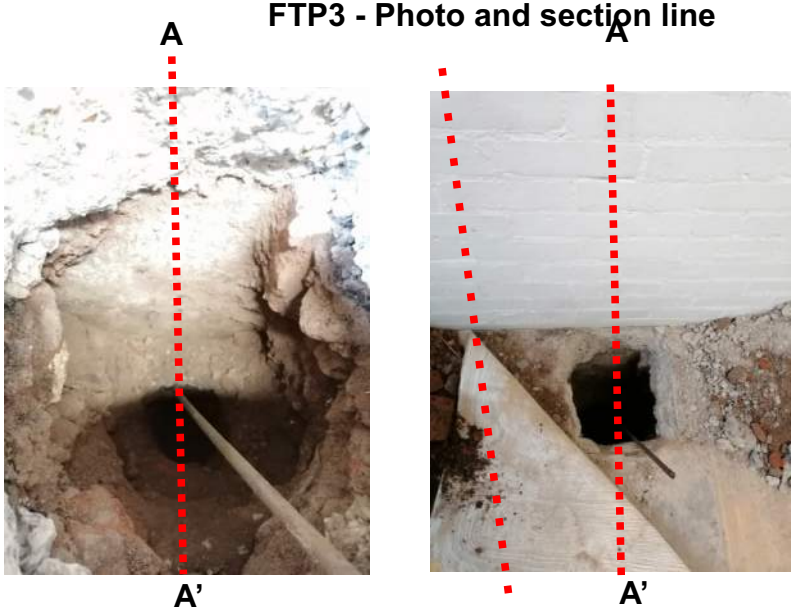
Hand Shear Vane
No suitable soil for testing

Groundwater:
No groundwater encountered

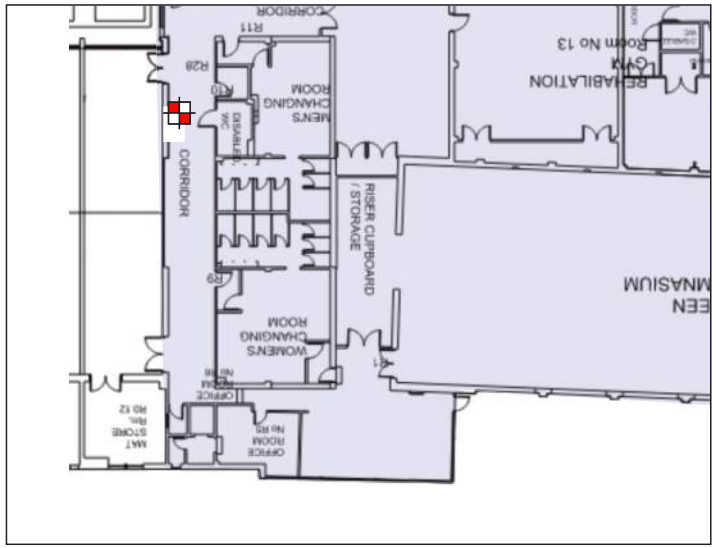
Excavation Remarks:
Sides stable
No obvious contamination
No significant routes
Backfilled with arisings

Notes:
1) Not to scale
2) Dimensions as shown
3) All positions are approximate
4) Drawing to be viewed in colour
5) Drawing to be viewed digitally
6) Not for construction detail
7) Based on plans provided the Client

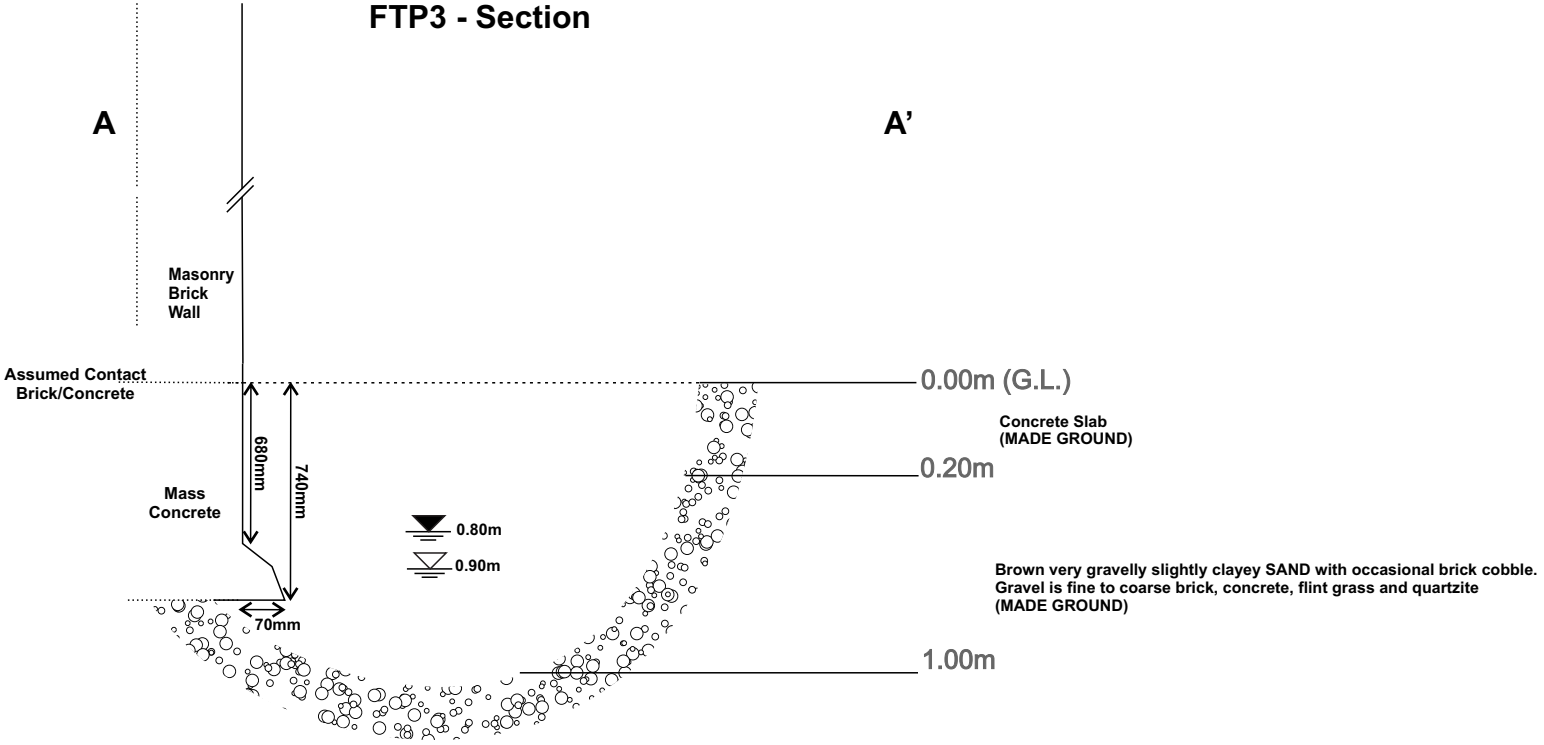
FTP3 - Photo and section line



FTP3 - Excavation Location



FTP3 - Section



PADDOCK GEO ENGINEERING

Foundation Trial Pit (FTP3) Section

Strawberry Hill Campus,
St Mary's University
Waldegrave Road,
Strawberry Hill,
Twickenham
TW1 4SX

St Mary's University

August 2024

Legend:

Foundation Inspection Trial Pit (FTP)

Trial pit details:
Samples:
C/D - 0.50m
C/D - 0.90m

Hand Shear Vane
No suitable soil for testing

Groundwater:
No groundwater encountered

Excavation Remarks:
Sides stable
No obvious contamination
No significant routes
Backfilled with arisings

Notes:
1) Not to scale
2) Dimensions as shown
3) All positions are approximate
4) Drawing to be viewed in colour
5) Drawing to be viewed digitally
6) Not for construction detail
7) Based on plans provided the Client

APPENDIX E

Soil Waste Classification Data

Hazwaste Online Classification Report
Chemical Analysis Reports (Waste Acceptance Criteria Testing)

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

EX439-AEXR1-FZEKL

Job name

Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

Description/Comments

Project

P24-234

Site

Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham TW1 4SX

Classified by

Name:
Matthew Paddock
Date:
20 Sep 2024 15:42 GMT
Telephone:
01908 271366

Company:
Paddock Geo Engineering
The Annex, 14 Burns Road,
Milton Keynes,
MK3 5A

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	-

Purpose of classification

2 - Material Characterisation

Address of the waste

Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry Hill, Twickenham **Post Code** TW1 4SX

SIC for the process giving rise to the waste

41202 Construction of domestic buildings

Description of industry/producer giving rise to the waste

Construction

Description of the specific process, sub-process and/or activity that created the waste

Foundation excavations and general site strip

Description of the waste

Soil and stones

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WAC1		Non Hazardous		3
2	WAC2		Non Hazardous		5

Related documents

#	Name	Description
1	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: Matthew Paddock

Created date: 20 Sep 2024 15:42 GMT

Classification of sample: WAC1

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
WAC1
Moisture content:
7.9%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.9% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		4.2	mg/kg	1.197	4.631	mg/kg	0.000463 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		14	mg/kg	1.32	17.024	mg/kg	0.0017 %	✓	
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.77	mg/kg	2.775	1.968	mg/kg	0.000197 %	✓	
4	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		1.1	mg/kg	3.22	3.262	mg/kg	0.000326 %	✓	
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.4	mg/kg	1.142	0.421	mg/kg	0.0000421 %	✓	
6	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		23	mg/kg	1.462	30.96	mg/kg	0.0031 %	✓	
7	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1.8	mg/kg	2.27	<4.086	mg/kg	<0.000409 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		32	mg/kg	1.126	33.182	mg/kg	0.00332 %	✓	
9	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	190	mg/kg	1.56	272.952	mg/kg	0.0175 %	✓	
10	manganese { manganese sulphate }	025-003-00-4	232-089-9	7785-87-7		380	mg/kg	2.749	961.942	mg/kg	0.0962 %	✓	
11	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<**LOD**
12	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		1.1	mg/kg	1.5	1.52	mg/kg	0.000152 %	✓	
13	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		17	mg/kg	2.976	46.599	mg/kg	0.00466 %	✓	
14	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
15	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		140	mg/kg	2.774	357.698	mg/kg	0.0358 %	✓	
16	TPH (C6 to C40) petroleum group			TPH		29	mg/kg		26.709	mg/kg	0.00267 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
17		pH		PH		7.6	pH		7.6	pH	7.6 pH		
18		naphthalene				0.37	mg/kg		0.341	mg/kg	0.0000341 %	✓	
		601-052-00-2	202-049-5	91-20-3									
19		acenaphthylene				0.09	mg/kg		0.0829	mg/kg	0.00000829 %	✓	
			205-917-1	208-96-8									
20		acenaphthene				0.56	mg/kg		0.516	mg/kg	0.0000516 %	✓	
			201-469-6	83-32-9									
21		fluorene				0.36	mg/kg		0.332	mg/kg	0.0000332 %	✓	
			201-695-5	86-73-7									
22		phenanthrene				5.9	mg/kg		5.434	mg/kg	0.000543 %	✓	
			201-581-5	85-01-8									
23		anthracene				0.75	mg/kg		0.691	mg/kg	0.0000691 %	✓	
			204-371-1	120-12-7									
24		fluoranthene				6.6	mg/kg		6.079	mg/kg	0.000608 %	✓	
			205-912-4	206-44-0									
25		pyrene				5.3	mg/kg		4.881	mg/kg	0.000488 %	✓	
			204-927-3	129-00-0									
26		benzo[a]anthracene				2.7	mg/kg		2.487	mg/kg	0.000249 %	✓	
		601-033-00-9	200-280-6	56-55-3									
27		chrysene				2.9	mg/kg		2.671	mg/kg	0.000267 %	✓	
		601-048-00-0	205-923-4	218-01-9									
28		benzo[b]fluoranthene				3.6	mg/kg		3.316	mg/kg	0.000332 %	✓	
		601-034-00-4	205-911-9	205-99-2									
29		benzo[k]fluoranthene				1.3	mg/kg		1.197	mg/kg	0.00012 %	✓	
		601-036-00-5	205-916-6	207-08-9									
30		benzo[a]pyrene; benzo[def]chrysene				2.8	mg/kg		2.579	mg/kg	0.000258 %	✓	
		601-032-00-3	200-028-5	50-32-8									
31		indeno[123-cd]pyrene				1.5	mg/kg		1.381	mg/kg	0.000138 %	✓	
			205-893-2	193-39-5									
32		dibenz[a,h]anthracene				0.4	mg/kg		0.368	mg/kg	0.0000368 %	✓	
		601-041-00-2	200-181-8	53-70-3									
33		benzo[ghi]perylene				1.7	mg/kg		1.566	mg/kg	0.000157 %	✓	
			205-883-8	191-24-2									
										Total:	0.17 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 100 mg/kg (0.01%) because: PGE In-house values based on WM3

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00267%)

Classification of sample: WAC2

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
WAC2
Moisture content:
7.9%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.9% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		3	mg/kg	1.197	3.308	mg/kg	0.000331 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		15	mg/kg	1.32	18.24	mg/kg	0.00182 %	✓	
3	beryllium { beryllium oxide }	004-003-00-8	215-133-1	1304-56-9		0.67	mg/kg	2.775	1.713	mg/kg	0.000171 %	✓	
4	boron { diboron trioxide }	005-008-00-8	215-125-8	1303-86-2		0.6	mg/kg	3.22	1.779	mg/kg	0.000178 %	✓	
5	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		<0.2	mg/kg	1.142	<0.228	mg/kg	<0.0000228 %		<**LOD**
6	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		21	mg/kg	1.462	28.268	mg/kg	0.00283 %	✓	
7	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1.8	mg/kg	2.27	<4.086	mg/kg	<0.000409 %		<**LOD**
8	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		26	mg/kg	1.126	26.961	mg/kg	0.0027 %	✓	
9	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	40	mg/kg	1.56	57.464	mg/kg	0.00368 %	✓	
10	manganese { manganese sulphate }	025-003-00-4	232-089-9	7785-87-7		360	mg/kg	2.749	911.314	mg/kg	0.0911 %	✓	
11	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.3	mg/kg	1.353	<0.406	mg/kg	<0.0000406 %		<**LOD**
12	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		0.96	mg/kg	1.5	1.326	mg/kg	0.000133 %	✓	
13	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		17	mg/kg	2.976	46.599	mg/kg	0.00466 %	✓	
14	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<**LOD**
15	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		55	mg/kg	2.774	140.524	mg/kg	0.0141 %	✓	
16	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
17		pH		PH		8	pH		8	pH	8pH		
18		naphthalene	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-052-00-2											
19		acenaphthylene	205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
20		acenaphthene	201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
21		fluorene	201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
22		phenanthrene	201-581-5	85-01-8		0.17	mg/kg		0.157	mg/kg	0.0000157 %	✓	
23		anthracene	204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
24		fluoranthene	205-912-4	206-44-0		0.23	mg/kg		0.212	mg/kg	0.0000212 %	✓	
25		pyrene	204-927-3	129-00-0		0.2	mg/kg		0.184	mg/kg	0.0000184 %	✓	
26		benzo[a]anthracene	200-280-6	56-55-3		0.1	mg/kg		0.0921	mg/kg	0.00000921 %	✓	
		601-033-00-9											
27		chrysene	205-923-4	218-01-9		0.14	mg/kg		0.129	mg/kg	0.0000129 %	✓	
		601-048-00-0											
28		benzo[b]fluoranthene	205-911-9	205-99-2		0.12	mg/kg		0.111	mg/kg	0.0000111 %	✓	
		601-034-00-4											
29		benzo[k]fluoranthene	205-916-6	207-08-9		0.08	mg/kg		0.0737	mg/kg	0.00000737 %	✓	
		601-036-00-5											
30		benzo[a]pyrene; benzo[def]chrysene	200-028-5	50-32-8		0.1	mg/kg		0.0921	mg/kg	0.00000921 %	✓	
		601-032-00-3											
31		indeno[123-cd]pyrene	205-893-2	193-39-5		0.09	mg/kg		0.0829	mg/kg	0.00000829 %	✓	
32		dibenz[a,h]anthracene	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
		601-041-00-2											
33		benzo[ghi]perylene	205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<**LOD**
										Total:	0.124 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings (edit as required)

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

beryllium {beryllium oxide}

Reasonable case CLP species based on hazard statements/molecular weight. Industrial sources include: most common (non alloy) form, used in ceramics (edit as required)

boron {diboron trioxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

manganese {manganese sulphate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2024.262.6242.11433 (18 Sep 2024)
HazWasteOnline Database: 2024.262.6242.11433 (18 Sep 2024)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021
GB MCL List v2.0 - version 2.0 of 20th October 2023
GB MCL List v3.0 - version 3.0 of 11th January 2024
GB MCL List v4.0 - version 4.0 of 2nd March 2024
GB MCL List v5.0 - version 5.0 of 26th June 2024

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Analytical Report Number : 24-037856

Project / Site name:	Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry	**Samples received on:**	16/08/2024
Your job number:	P24-234	**Samples instructed on/ Analysis started on:**	22/08/2024
Your order number:		**Analysis completed by:**	02/09/2024
Report Issue Number:	1	**Report issued on:**	04/09/2024
Samples Analysed:	2 10:1 WAC samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-037856

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Lab Sample Number				294448	294449
Sample Reference				WAC1	WAC2
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.9	7.9
Total mass of sample received	kg	0.1	NONE	1.1	1.1
General Inorganics					
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.3	0.4
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	0.36	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.09	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.57	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.35	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	6.1	0.18
Anthracene	mg/kg	0.05	MCERTS	0.74	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	6.7	0.24
Pyrene	mg/kg	0.05	MCERTS	5.5	0.21
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.6	0.08
Chrysene	mg/kg	0.05	MCERTS	2.9	0.11
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	3.7	0.14
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.6	0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.8	0.07
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.4	0.06
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.32	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.7	0.08
Coronene	mg/kg	0.05	NONE	0.61	< 0.05
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	37.5	1.21
Total WAC-17 PAHs	mg/kg	0.85	NONE	38.1	1.21
Petroleum Hydrocarbons					
Mineral Oil (EC10 - EC40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	< 10
VOCs					
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
Total BTEX	µg/kg	5	MCERTS	< 5.0	< 5.0
PCBs by GC-MS					
PCB Congener 28	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS	0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS	0.002	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS	0.003	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS	0.003	< 0.001

Analytical Report Number: 24-037856

Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Lab Sample Number				294448	294449
Sample Reference				WAC1	WAC2
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				13/08/2024	13/08/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Total PCBs	mg/kg	0.007	MCERTS	0.009	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Waste Acceptance Criteria Analytical Results

Report No:	**24-037856**						
					Client:	**PADDOCK**	
Location	**/berry Hill Campus, St Mary's University, Waldegrave Road, Strawb**						
Lab Reference (Sample Number)	294448				**Landfill Waste Acceptance Criteria**		
					Limits		
Sampling Date	13/08/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WAC1						
Depth (m)							
Solid Waste Analysis							
TOC (%)**	1.3				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	0.009				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	38.1				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.00443			0.0443	0.5	2	25
Barium *	0.0311			0.311	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.0039			0.039	0.5	10	70
Copper *	0.034			0.34	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00475			0.0475	0.5	10	30
Nickel *	0.0023			0.023	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	0.0028			0.028	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0098			0.098	4	50	200
Chloride *	2.8			28	800	15000	25000
Fluoride*	0.42			4.2	10	150	500
Sulphate *	48			480	1000	20000	50000
TDS*	130			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	19.6			196	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	92						
Moisture (%)	7.9						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	**24-037856**						
					Client:	**PADDOCK**	
Location	**/berry Hill Campus, St Mary's University, Waldegrave Road, Strawb**						
Lab Reference (Sample Number)	294449				**Landfill Waste Acceptance Criteria**		
					Limits		
Sampling Date	13/08/2024				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WAC2						
Depth (m)							
Solid Waste Analysis							
TOC (%)**	0.4				3%	5%	6%
Loss on Ignition (%) **	-				--	--	10%
BTEX (µg/kg) **	< 5.0				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	1.21				100	--	--
pH (units)**	-				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	-				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.00100			< 0.0100	0.5	2	25
Barium *	0.0164			0.164	20	100	300
Cadmium *	< 0.000100			< 0.00100	0.04	1	5
Chromium *	0.00061			0.0061	0.5	10	70
Copper *	0.012			0.12	2	50	100
Mercury *	< 0.000500			< 0.00500	0.01	0.2	2
Molybdenum *	0.00375			0.0375	0.5	10	30
Nickel *	0.0014			0.014	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0043			0.043	4	50	200
Chloride *	2.0			20	800	15000	25000
Fluoride*	0.32			3.2	10	150	500
Sulphate *	34			340	1000	20000	50000
TDS*	82			820	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	16.0			160	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.1						
Dry Matter (%)	92						
Moisture (%)	7.9						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 24-037856
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
294448	WAC1	None Supplied	None Supplied	Brown loam with gravel and vegetation
294449	WAC2	None Supplied	None Supplied	Brown loam with gravel

Analytical Report Number : 24-037856
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with hexane followed by GC-MS	In-house method based on USEPA 8082	L027B	D	MCERTS
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031B	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination	L033B	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Sample Preparation		In-house method	L043B	W	NONE
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS	In-house method	L076B/L088-PL	D/W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025

Analytical Report Number : 24-037856
Project / Site name: Strawberry Hill Campus, St Mary's University, Waldegrave Road, Strawberry H

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

APPENDIX F

Ground Gas Monitoring Data

Monitoring Data

GAS MONITORING SHEET

PADDOCK GEO ENGINEERING

Site: Strawberry Hill Campus, Twickenham, TW14SX

Project: P24-234

											Max CH4: 0.1			Max CO2: 4.1			Min O2: 17.3			Max VOC: 1 Max H2S: 0 Max CO: 0			Max 0 L/hr
											GSV CH4: 0.0001			GSV CO2: 0.0041									
Visit no	**Loc.**	**Date**	**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	WS02	19/08/24	AA	19	Overcast	0.0	1012	Dry	3.00	0.00	0.00	0.00	0.00	3.00	3.20	3.30	18.7	18.5	18.4	0.70	**0.00**	**0.00**	**0.00**
1	WS03	19/08/24	AA	19	Overcast	0.0	1012	Dry	1.77	0.00	0.00	0.00	0.00	2.30	2.40	2.40	19.1	18.9	18.9	0.00	**0.00**	**0.00**	**0.00**
2	WS02	28/08/24	AA	24	Sunny	0.0	1008	Dry	3.00	0.00	0.00	0.00	0.00	3.80	3.60	3.70	18.2	18.1	18.1	**1.00**	**0.00**	**0.00**	**0.00**
2	WS03	28/08/24	AA	24	Sunny	0.0	1008	Dry	1.77	0.00	0.00	0.00	0.00	3.40	3.00	3.10	18.0	18.6	18.5	0.00	**0.00**	**0.00**	**0.00**
3	WS02	11/09/24	MG	19	Overcast	0.0	1006	Dry	3.00	0.00	0.00	0.00	0.00	0.40	0.10	0.10	20.0	20.4	20.4	0.00	**0.00**	**0.00**	**0.00**
3	WS03	11/09/24	MG	19	Overcast	0.0	1006	Dry	1.77	0.00	0.00	0.00	0.00	2.30	3.00	3.10	18.5	17.7	17.5	0.00	**0.00**	**0.00**	**0.00**
4	WS02	19/09/24	AA	17	Cloudy	0.0	1022	Dry	3.00	0.00	**0.10**	**0.10**	**0.10**	**4.10**	**4.10**	**4.10**	17.4	**17.3**	**17.3**	0.00	**0.00**	**0.00**	**0.00**
4	WS03	19/09/24	AA	17	Cloudy	0.0	1022	Dry	1.77	0.00	0.00	0.00	0.00	2.80	2.80	2.80	18.0	18.0	18.0	0.00	**0.00**	**0.00**	**0.00**

Comments: WS01 - Unable to access due to parked car.

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.

C. THAMES WATER SEWER RECORDS

Asset Location Search

Thames Water Property Searches

Ridge and Partners LLP
3
Valentine Place
LONDON
SE1 8QH

Search address supplied St Mary's University Twickenham
Waldegrave Road
London
TW1 4SX

Your reference 5025779

Our reference ALS/ALS Standard/2024_5055164

Search date 25 September 2024

Notification of Price Changes

From 1st April 2024 Thames Water Property Searches will be increasing the prices of its CON29DW Residential and Commercial searches along with the Asset Location Search. Costs will rise in line with RPI as per previous years, which is sat at 6%.

Customers will be emailed with the new prices by February 28th 2024.

Any orders received with a higher payment prior to the 1st April 2024 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0800 009 4540

Asset Location Search

Property Searches

Search address supplied: St Mary's University Twickenham, Waldegrave Road, London, TW1 4SX

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and

pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

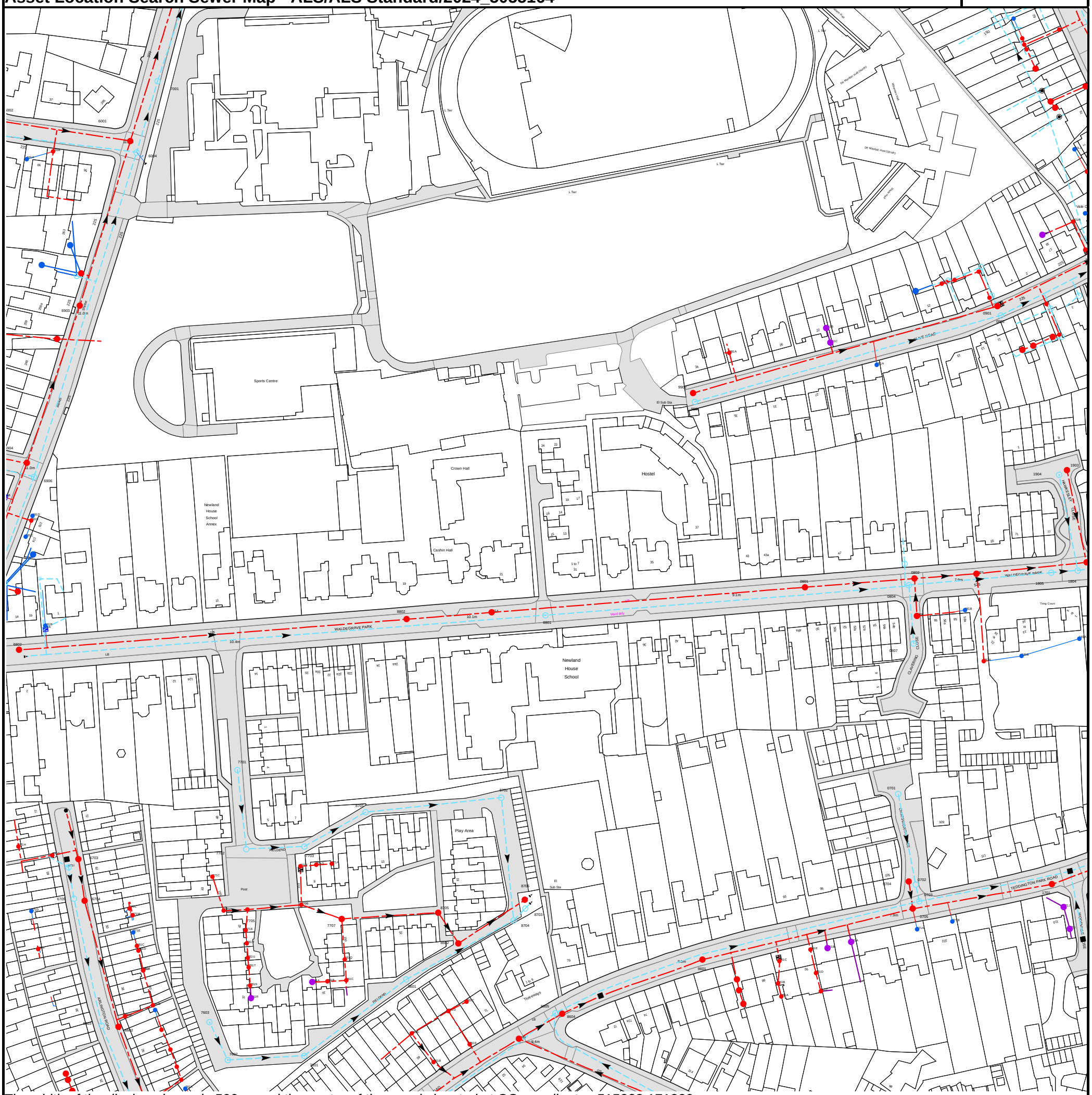
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2024_5055164



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 515888,171880

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
601A	n/a	n/a
60ZQ	n/a	n/a
601B	n/a	n/a
69ZS	n/a	n/a
60ZX	n/a	n/a
60ZS	n/a	n/a
6903	11	7.97
60ZW	n/a	n/a
6001	11.1	7.75
6004	11.03	8.82
7001	11.12	8.77
991A	n/a	n/a
68YV	n/a	n/a
68ZS	n/a	n/a
671H	n/a	n/a
6802	10.7	8.21
6904	10.96	n/a
671D	n/a	n/a
681D	n/a	n/a
68YW	n/a	n/a
6906	10.83	8.98
661F	n/a	n/a
68XV	n/a	n/a
681A	n/a	n/a
101A	n/a	n/a
101J	n/a	n/a
10MK	n/a	n/a
10MJ	n/a	n/a
10MH	n/a	n/a
11MJ	n/a	n/a
11MH	n/a	n/a
11MM	n/a	n/a
11MN	n/a	n/a
11ML	n/a	n/a
11NG	n/a	n/a
11NC	n/a	n/a
091C	n/a	n/a
091B	n/a	n/a
0902	n/a	n/a
0901	n/a	n/a
09NM	n/a	n/a
09NJ	n/a	n/a
09NK	n/a	n/a
001A	n/a	n/a
00NM	n/a	n/a
00NL	n/a	n/a
00NH	n/a	n/a
00NK	n/a	n/a
00NE	n/a	n/a
01NK	n/a	n/a
19NH	n/a	n/a
19NF	n/a	n/a
101I	n/a	n/a
19NK	n/a	n/a
19MM	n/a	n/a
19NE	n/a	n/a
19NL	n/a	n/a
19MN	n/a	n/a
101H	n/a	n/a
19MC	n/a	n/a
101K	n/a	n/a
101G	n/a	n/a
181B	n/a	n/a
181A	n/a	n/a
1805	n/a	n/a
1804	7.21	4.83
1801	7.23	5.03
1904	n/a	n/a
1903	6.8	5.51
961C	n/a	n/a
071A	n/a	n/a
071B	n/a	n/a
8704	n/a	n/a
8703	n/a	n/a
0703	n/a	n/a
8706	n/a	n/a
0702	n/a	n/a
0704	n/a	n/a
8702	n/a	n/a
0701	n/a	n/a
081A	n/a	n/a
0807	8.29	7.2
0806	8.18	6.25
8801	n/a	n/a
081B	n/a	n/a
0801	8.9	6.51
0804	8.38	5.57
0802	8.33	5.96
0803	7.96	5.66
08NL	n/a	n/a
9901	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
9902	n/a	n/a
091A	n/a	n/a
761A	n/a	n/a
761B	n/a	n/a
761C	n/a	n/a
8601	n/a	n/a
861A	n/a	n/a
861B	n/a	n/a
861D	n/a	n/a
861C	n/a	n/a
861E	n/a	n/a
7702	n/a	n/a
761V	n/a	n/a
7705	n/a	n/a
761U	n/a	n/a
771B	n/a	n/a
7706	n/a	n/a
7703	n/a	n/a
771D	n/a	n/a
771A	n/a	n/a
7707	n/a	n/a
761Q	n/a	n/a
8701	n/a	n/a
8802	10.08	7.29
8705	n/a	n/a
8602	n/a	n/a
881A	n/a	n/a
7603	n/a	n/a
7602	n/a	n/a
761T	n/a	n/a
761S	n/a	n/a
761R	n/a	n/a
7601	n/a	n/a
681B	n/a	n/a
671G	n/a	n/a
671I	n/a	n/a
6705	n/a	n/a
6703	n/a	n/a
6704	n/a	n/a
671L	n/a	n/a
671M	n/a	n/a
671E	n/a	n/a
661C	n/a	n/a
661D	n/a	n/a
771C	n/a	n/a
7704	n/a	n/a
7701	n/a	n/a
771E	n/a	n/a
66ZS	n/a	n/a
66ZR	n/a	n/a
66ZQ	n/a	n/a
6603	n/a	n/a
6602	n/a	n/a
661E	n/a	n/a
761E	n/a	n/a
761F	n/a	n/a
761G	n/a	n/a
76YZ	n/a	n/a
76ZW	n/a	n/a
76ZV	n/a	n/a
76ZT	n/a	n/a
76ZS	n/a	n/a
761K	n/a	n/a
1701	n/a	n/a
171B	n/a	n/a
171A	n/a	n/a
8603	n/a	n/a
8604	n/a	n/a
8605	n/a	n/a
96ZW	n/a	n/a
961A	n/a	n/a
96ZV	n/a	n/a
961B	n/a	n/a
96ZT	n/a	n/a
171I	n/a	n/a
0705	n/a	n/a
171J	n/a	n/a
061C	n/a	n/a
061D	n/a	n/a
9601	n/a	n/a
061E	n/a	n/a
061B	n/a	n/a
061A	n/a	n/a
681C	n/a	n/a
681E	n/a	n/a

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement
- Conduit Bridge
- Subway
- Tunnel

Ducts may contain high voltage cables. Please check with Thames Water.

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2024_5055164

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 515888, 171880.

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Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 980 8800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**
Please Call **0800 009 4540** quoting your invoice number starting CBA or ADS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number