SHELDON HOUSE, CROMWELL ROAD, TEDDINGTON, TW11 9EJ

RHP DEVELOP LIMITED

FLOOD RISK STATEMENT AND DRAINAGE STRATEGY

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DOCUMENT CONTROL SHEET

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1.0 INTRODUCTION

Preface

1.1 Ardent Consulting Engineers (hereafter referred to as Ardent) has been commissioned by RHP Develop Limited to prepare a Flood Risk Statement and Drainage Strategy for a proposed development at the site of the former Sheldon House off Cromwell Road, Teddington (hereafter referred to as the "Site").

1.2 The statement has been prepared to accompany a planning application to the London Borough of Richmond upon Thames as both local planning authority and lead local flood authority.

1.3 This statement has been written with specific reference to the requirements of the National Planning Framework (NPPF – July 2021) and the Planning Practice Guidance (March 2014 – updated August 2022).

2.0 BASELINE PARAMETERS

Existing Site

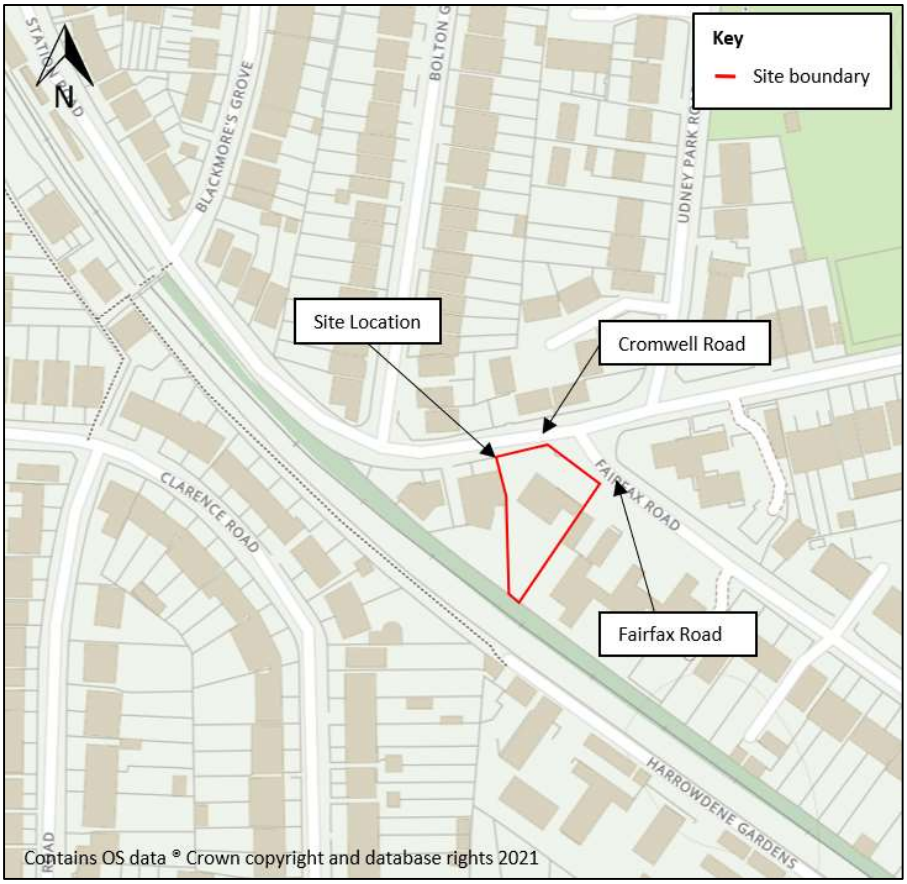


Figure 2-1: Site Location Plan

2.1. The Site currently consists of the former Sheldon House and associated hardstand parking. It is located south of Cromwell Road and west of Fairfax Road and is surrounded by residential properties. The Site is at OS grid reference 516264, 170626 and the nearest post code is TW11 9EJ. Refer to **Figure 2-1** above.

2.2. The Site is currently approximately 68% impermeable.

Development Proposals

2.3. The scheme proposals comprise the demolition of the building to allow the construction of a new 5-storey residential development providing 27 residential units.

2.4. Amenity space will also be provided consisting of balconies, private garden areas and communal space.

2.5. An extract of the proposed site layout ground floor plan as of December 2022 is shown in **Figure 2-2** below.

Figure 2-2 Proposed Development (Ground Floor)

2.6. The development is classified as having an overall 'More Vulnerable' land use within the NPPF.

Topography

2.7. A topographical survey of the former Sheldon House area of the site was carried out by Magnolia Square in March 2021. The surveys is included in **Appendix A**.

2.8. The survey shows external areas of the Site to be relatively flat, in the order of 9.06 to 9.26m AOD.

Hydrology

2.9. The nearest main River is the River Thames located approximately 950m to the north-east of the site. There are no other main rivers in the vicinity of the site.

2.10. The Longford River is located approximately 1.5km to the west of the site and there is also a watercourse through Hampton Wick 950m to the south of the site. There are no other surface water bodies within the vicinity of the site. The site hydrology is shown in **Figure 2-3.**

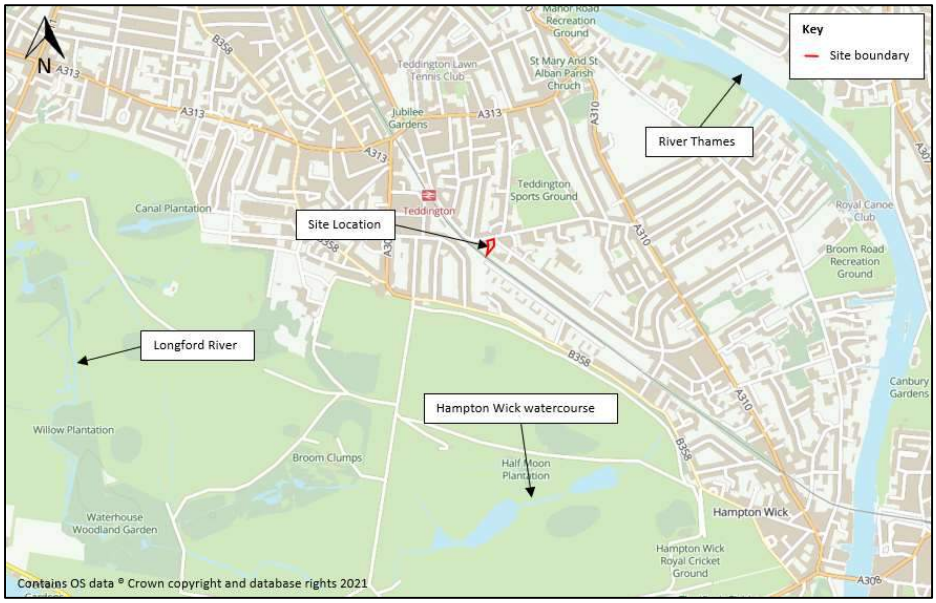


Figure 2-3: Rivers and Watercourses

Ground Conditions

2.11. Using data from the British Geological Survey (BGS) as displayed in **Figures 2-4 and 2-5** below, the Site is shown to be underlain by superficial deposits of sands and gravels of the Kempton Park Gravel Member which are in turn underlain by the London Clay formation.

2.12. Borehole records from approximately 240m east of site (ref TQ17SE115) indicate the ground conditions to comprise "made ground" to a depth of 0.75m bgl (metres below ground level) underlain by "sandy clay and stones" to a depth of 3mbgl, which is in turn underlain by "gravel" to a depth of 5.3mbgl, which is underlain by a series of varying clays until the base of the borehole at 42.7mbgl. No groundwater was encountered within this borehole. However, from a borehole record approximately 200m north-west of the site (ref TQ17SE10) with a similar soil stratum, groundwater was found at 3.81mbgl. Refer to **Appendix B** for the borehole logs.

Figure 2-4: BGS Geology Maps (Bedrock Geology)

Figure 2-5: BGS Geology Maps (Superficial Geology)

2.13. An environmental 'Phase II Site Investigation Report' was undertaken by AGB Environmental in August 2022 in preparation for the works. The ground conditions identified were similar to above with made ground to a depth of 0.6mbgl, underlain by superficial geology of the Kempton Park Gravel Member with varying density with some slightly gravelly sand from 1.2 to 3.7mbgl, succeeded by either sandy silt or gravelly sand. Underlying the superficial geology was the London Clay Formation, encountered as a firm to stiff grey clay to 9.50mbgl, followed by claystone to 10.40mbgl, and stiff grey clay with occasional claystone patches to 25.00mbgl. Groundwater seepage was encountered at 2.2mbgl during the formation of a borehole. During monitoring groundwater was observed in between 4.13mbgl and 4.19mbgl.

2.14. Chemical laboratory testing was undertaken by AGB Environmental in August 2022 and detailed as part of the 'Phase II Site Investigation Report'. Elevated concentrations of lead and four congeners of polycyclic aromatic hydrocarbons were identified in soil samples from four locations at depths between 0.20mbgl and 1.00mbgl. Elevated concentrations of cadmium, nickel and zinc were also identified in groundwater sampling which exceeds water quality standards for surface water.

2.15. The report concluded the following:

2.16. *"The exceedances in relation to surface water quality standards are not considered to be significant given the industrial history of the surrounding area and the lack of exceedances during a subsequent round of monitoring and sampling. The closest surface water receptor is a lake in Bushy Park, located approximately 850m south of site. Given the distance to the identified receptor, an unacceptable risk is not considered to be present."*

2.17. The 'Phase II Site Investigation Report' can be found in **Appendix C**.

2.18. The Department for the Environment, Food and Rural Affairs (Defra) mapping indicates the Site is not located within a Source Protection Zone. However, it is located within a Drinking Water Safeguard Zone (Surface Water).

Existing Sewer Infrastructure

2.19. An extract of Thames Water sewer records is provided in **Figure 2-6** below. A full copy of the plan is included in **Appendix D**.

2.20. The plan shows public surface water sewers run along Cromwell Road and Fairfax Road surrounding the site. A number of gullies are present within the site boundary therefore it is assumed that a private drainage network exists that connects to the surface water sewer.

2.21. A number of foul sewers also exist around the site. Foul sewers are present on Cromwell Road and Fairfax Road.

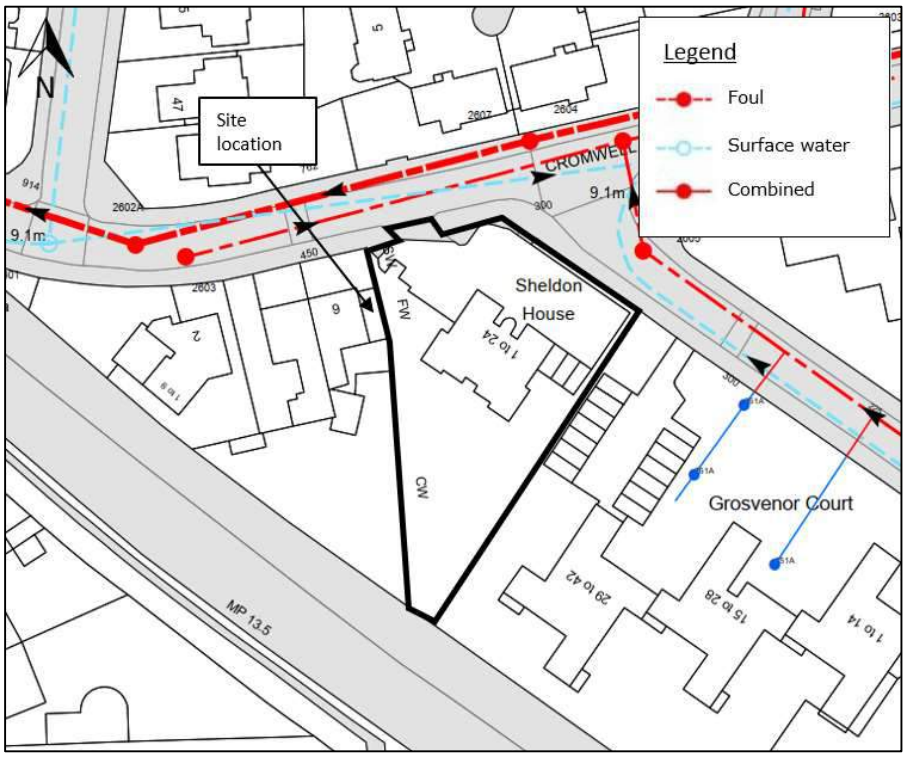


Figure 2-6: Extract of Thames Water Sewer Records

3.0 POLICY CONTEXT

National Planning Policy Framework (July 2021)

3.1 The National Planning Policy Framework (NPPF) was introduced on 27 March 2012 and revised in July 2018 and again in February 2019 and July 2021; paragraphs 159 to 169 inclusive, establish the Planning Policy relating to flood risk management. The Technical Guide to the NPPF was superseded by the Planning Practice Guidance (PPG) in March 2014.

3.2 The main focus of the policy is to direct development towards areas of the lowest practicable flood risk and to ensure that all development is safe, without increasing flood risk elsewhere. The main considerations are:

a) applying the sequential test and then, if necessary, the exception test as set out below;

b) safeguarding land from development that is required, or is likely to be required, for current of future flood management;

c) using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development including housing, to more sustainable locations.

Flood and Water Management Act (2010)

3.3 The Flood and Water Management Act places a duty on all flood risk management authorities to co-operate with each other. The act also provides lead local flood authorities and the Environment Agency with a power to request information required in connection with their flood risk management functions.

Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems March 2015

3.4 The Non-statutory technical standards for sustainable drainage systems were published in March 2015. This document sets out non-statutory technical standards for sustainable drainage systems. They should be used in conjunction with the Planning Practice Guidance. In addition, the Best Practice Guidance for the Non statutory technical standards was published in July 2015 by LASOO (Local Authority SuDS Officer Organisation).

3.5 The Local Planning Authority (LPA) may set local requirements for planning permission that have the effect of more stringent requirements than these non-statutory technical standards.

3.6 In addition, SuDS should be designed in accordance with CIRIA 753 "The SuDS Manual", which represents current best practice.

Sequential Test

3.7 The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.

3.8 As the Site is shown to be located within Flood Zone 1 of the Environment Agency flood mapping, it is not necessary for the Site to undergo the Sequential Test.

Exception Test

3.9 Table 3 of the PPG replicated below in **Table 3-1**, confirms that the Exception Test is not required for "More Vulnerable" uses in Flood Zone 1.

Table 0-1: Extract from the PPG: Flood Risk Vulnerability

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Regional & Local Planning Policy

3.10 In the preparation of this report, reference is made to the following regional and local planning documents:

- London Borough of Richmond upon Thames Strategic (Richmond) Flood Risk Assessment (SFRA) – Level 1, March 2021;
- London Borough of Richmond upon Thames Surface Wateer Management Plan (SWMP), December 2021;
- London Borough of Richmond upon Thames Preliminary Flood Risk Assessment (Drain London), May 2011;
- London Borough of Richmond upon Thames Further Groundwater Investigations, March 2021;
- London Borough of Richmond upon Thames Local Flood Risk Management Strategy (August 2015);
- The London Borough of Richmond Local Plan (Draft Issue – December 2021).

3.11 London Borough of Richmond upon Thames as Lead Local Flood Authority is responsible for managing local flood risk originating from surface runoff, groundwater and ordinary watercourses.

The London Borough of Richmond Local Plan (Draft Issue – December 2021)

3.12 The Richmond Local Plan, issued as a 'Pre-Publication' draft, is the key strategic planning document for Richmond, setting out the Council's proposed vision, objectives and spatial strategy.

3.13 The document includes place-based strategies, site allocations and policies which will support the delivery of the Plan's vision and objectives and spatial strategy. It identifies where development will take place and how places within the borough will change.

3.14 The following policies are related to *Water and Flooding*:

- Policy 3: Tackling the climate emergency
- Policy 8: Flood risk and sustainable drainage
- Policy 9: Water resources and infrastructure
- Policy 34: Green and Blue Infrastructure

4.0 SOURCES OF FLOODING

4.1. Environment Agency (EA) Flood Map indicates that the site is located entirely within Flood Zone 1 (low risk of fluvial/tidal flooding) and is almost entirely at very low risk of pluvial flooding. The Site is not located within a Critical Drainage Area and is less than 1 ha. Consequently, a formal Flood Risk Assessment is not required and there is no requirement for the Sequential and Exception Tests to be undertaken.

4.2. However, the following sections outline the low risk of flooding from the sources above and also assess flood risk from all other sources.

4.3. The NPPF requires flood risk from the following sources to be assessed, each of which are assessed separately below:

- Fluvial sources (river flooding);
- Tidal sources (flooding from the sea);
- Groundwater sources;
- Pluvial sources (flooding resulting from overland flows);
- Sewer Flooding;
- Artificial sources, canals, reservoirs etc.; and,
- It also requires the risk from increases in surface water discharge to be assessed (surface water management).

Fluvial/ Tidal Flood Risk

4.4. According to the Environment Agency's indicative flood map for planning, as illustrated in **Figure 4-1** below, the Site is located within Flood Zone 1, defined as having a low risk of flooding and being suitable for any type of development.

4.5. It is therefore concluded that the risk of fluvial/tidal flooding to the Site, or from the development to offsite areas, is low.

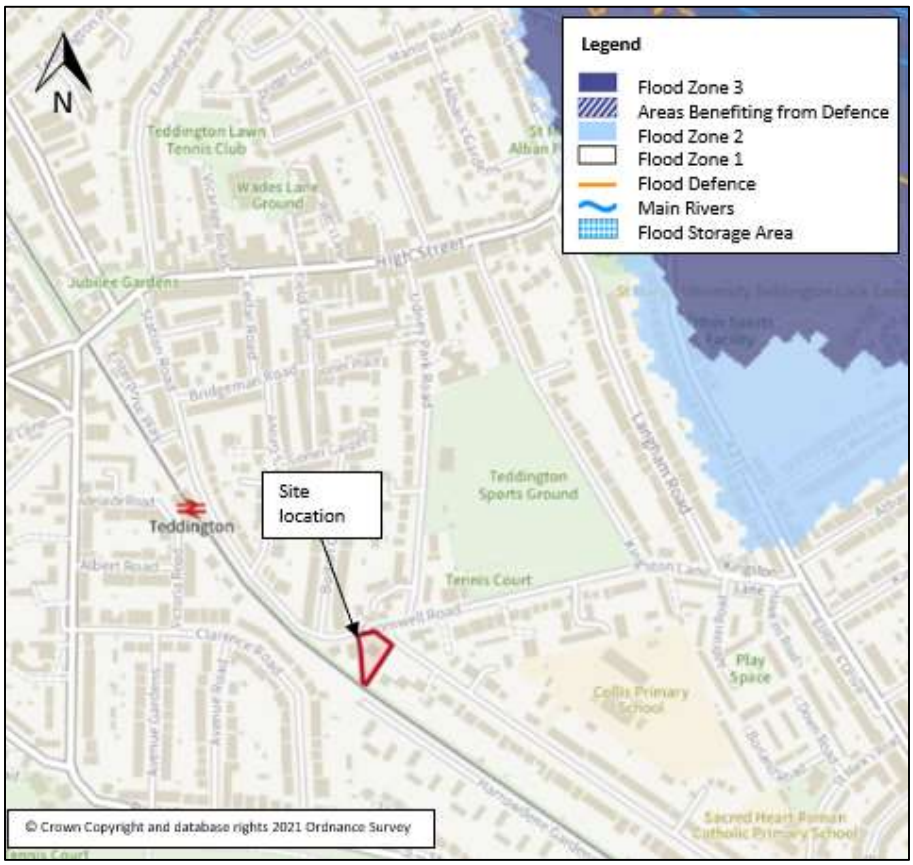


Figure 4-1: Environment Agency Flood Map for Planning

Pluvial Flood Risk

4.6. The Environment Agency's surface water flood map shows that the Site is almost entirely situated at 'Very Low' risk of surface water flooding (**Figure 4-2**).

4.7. A small area of low risk flooding exists at the south of the site. As the surface water originated on the Site, it is believed it will be managed as part of the surface water management plan.

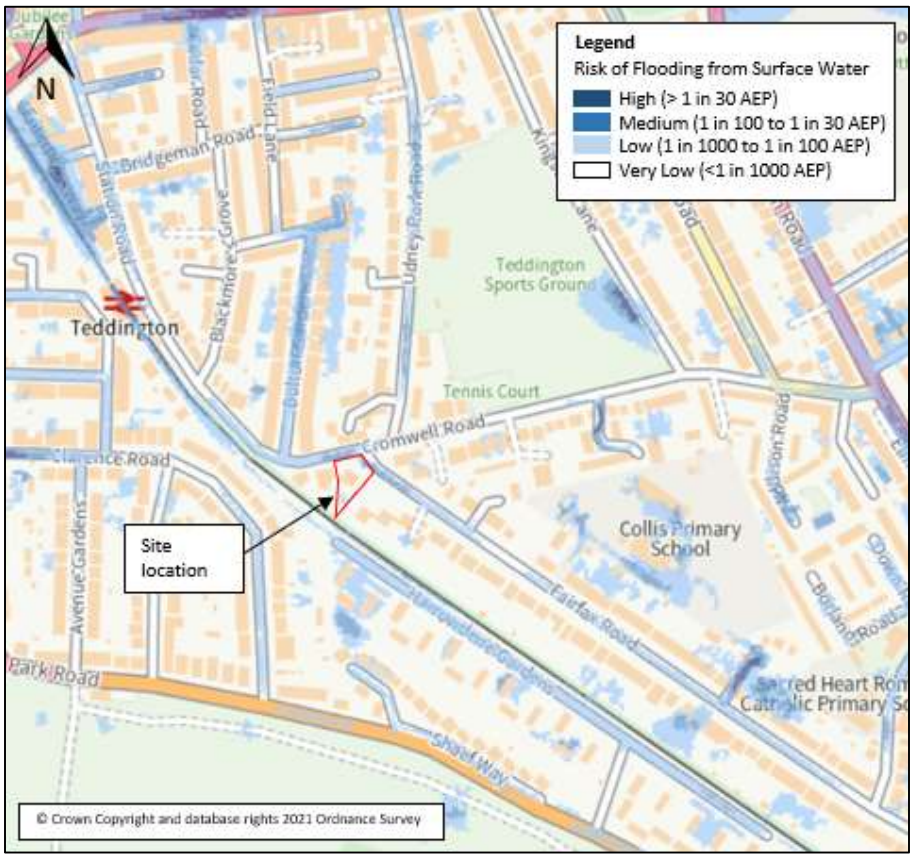


Figure 4-2: Environment Agency Flood Map for Surface Water (Extents)

4.8. The landscaping proposals are anticipated to decrease the impermeable area of the Site and changes to surface water flow paths as a result of the development will be minimal.

4.9. The risk of pluvial flooding to the Site is therefore assessed low. The development of the Site will bring improvements to the surrounding area through the implementation of a surface water drainage strategy, as described in **Section 5** of this report.

Groundwater Flood Risk

4.10. The EA Susceptibility to Groundwater Flooding Mapping included in the SFRA shows that the site is located in an area with greater than or equal to 75% susceptibility to groundwater flooding. Refer to **Figure 4-3** below.

Figure 4-3: BGS Susceptibility to Groundwater Flooding

4.11. During investigations undertaken by AGB Environmental in August 2022. Groundwater seepage was encountered at 2.2mbgl during the formation of a borehole. During monitoring groundwater was observed in between 4.13mbgl and 4.19mbgl. The 'Phase II Site Investigation Report' can be found in **Appendix C**.

4.12. **Figure 4-4** below shows the Increased Potential for Elevated Groundwater Map from the Richmond SFRA outlined by GLA Drain London. The map shows that the Site is underlain by permeable superficial deposits, suggesting an increased potential for groundwater flooding.

Figure 4-4: BGS Susceptibility to Groundwater Flooding

4.13. The development does not involve any below ground construction such as basements therefore risk of groundwater flood risk to the proposed development is likely to be low.

4.14. The groundwater flood risk to the site is considered to be medium.

Sewer Flood Risk

4.15. The flooding records held by Thames Water indicate that there have been no incidents of flooding in the site area as a result of surcharging public sewers.

4.16. The Thames flooding records held within the Richmond SFRA indicates that there has been 1 indoor and 1 outdoor flooding incident within the 181-ha study area.

4.17. The proposed drainage strategy as described in **Section 5** of this report, has been designed to accommodate rainfall volumes up to the

1 in 100 year plus 40% climate change and will therefore provide an improvement upon the current scenario.

4.18. The risk of flooding from sewers is therefore considered to be very low.

Flood Risk from Artificial Sources

4.19. The Environment Agency's flood maps from reservoirs indicate that the Site is not within an area at risk of flooding from reservoirs, canals, or other artificial water bodies.

4.20. The risk to the Site from reservoir flooding is therefore considered to be very low.

5.0 FOUL AND SURFACE WATER DRAINAGE STRATEGY

5.1. DEFRA's Non-statutory technical guidance for Sustainable Drainage Systems and CIRIA Guidance C753 "The SuDS Manual" have been used to determine the appropriate SuDS Strategy, which considers the spatial and environmental constraints of the Site.

5.2. Under the NPPF an allowance of 40% for the effects of climate change will achieve the policy requirements for the proposed development.

Proposed Sustainable Drainage Systems (SuDS)

5.3. In accordance with the London Plan Policy SI 13 (B), surface water runoff should be disposed of according to the following hierarchy:

1. Store rainwater for later use;
2. Use infiltration techniques, such as porous surfaces in non-clay areas;
3. Attenuate rainwater in ponds or open water features for gradual release;
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release;
5. Discharge rainwater direct to a watercourse;
6. Discharge rainwater to a surface water sewer/drain; and
7. Discharge rainwater to the combined sewer.

5.4. As discussed in **Section 2**, the Site is underlain by superficial deposits of sands and gravels which are in turn underlain by the London Clay formation. There is also an identified presence of high groundwater as well as an increased risk of groundwater flooding. Therefore, infiltration is unlikely to be feasible.

5.5. Made Ground is present on site therefore infiltration would pose the risk of mobilising pollutants (present in the Made Ground) into the underlying aquifer. This risk is increased by the presence of elevated concentrations of lead and four congeners of polycyclic aromatic hydrocarbons as identified in **Section 2**.

5.6. There are no watercourses in the vicinity of the Site. It is therefore proposed to discharge surface water runoff into the Thames Water surface water sewer along Cromwell Road. As the site is currently assumed to drain via an existing private drainage network connected

to this sewer, the proposals will have a minimal impact on surface water flood risk in the area and on the drainage network.

5.7. The constraints and opportunities for the use of SuDS techniques are appraised using the Management Train approach outlined in CIRIA C753 'The SuDS Manual' in **Table 5-1** below.

Table 5-1: Existing and Proposed Areas

Type:	**Infiltration Devices** (Source Control)
Constraints:	Ground Conditions do not allow for infiltration. Presence of made ground may lead to contamination. Limited space for infiltration systems (and provision of 5m buffer from buildings) due to narrow site surrounded by buildings. The Site is also a brownfield site (commercial/industrial use) and therefore the use of infiltration techniques would carry the risk of mobilising pollutants into the soil.
Opportunities:	Limited due to ground conditions and site layout
Type:	**Lined Permeable Paving** (Source Control)
Constraints:	It is not possible to provide infiltrating permeable paving/permavoid due to site characteristics (as per infiltration devices above).
Opportunities:	Permeable paving wrapped in geo-membrane could be used to provide surface water attenuation and a stage of treatment before discharging into the drainage system.
Type:	**Rainwater Harvesting** (Source Control)
Constraints:	The benefits of rainwater harvesting on a specific design storm event cannot be quantified, due to the seasonal availability of storage within the structure.
Opportunities:	Opportunities in amenity areas to provide harvesting features such as rain gardens, raised planters and water butts exist. However, it is difficult to quantify contribution, and therefore not included within calculations as part of this surface water management strategy
Type:	**Swales, etc.** (Permeable Conveyance)
Constraints:	In order to provide practicable attenuation benefits 1:3 side-slope swales tend to require a significant land requirement.
Opportunities:	None due to spatial constraints.
Type:	**Tree Pits/Rain gardens**
Constraints:	Subject to Landscape Architect's design.
Opportunities:	There may be opportunities to use landscaped space to incorporate tree pits.
Type:	**Green Roofs**
Constraints:	Subject to Architect's design.
Opportunities:	Green roofs could be provided on all flat roofs.
Type:	**Attenuation Tanks** (end of pipe treatment)
Constraints:	None
Opportunities:	Should additional attenuation be required this could be achieved by use of oversized sewers or geo-cellular storage attenuation.

5.8. After consideration of the CIRIA C753 SuDS Management Train approach, the most viable SuDS options for this site is a solution combining green roofs, permeable paving and geocellular storage. Additionally, rainwater butts would be provided on downpipes

adjacent to the communal garden and terraces. The exact location of these would be confirmed as part of the detailed design. Refer to Drawing **No. 2200650-001A** in **Appendix E** for the proposed surface water drainage strategy.

Existing and Proposed Surface Water Discharge Rates

Existing development

5.9. The planning red line boundary area equates to 0.165 ha and comprises of 0.111 ha impermeable surfaces and 0.054 ha of green landscaping.

5.10. The topographical survey shows a number of gullies and inspection chambers serving the northern portion of the Site; the outfall location of this system is currently unknown and should be investigated on site, but it is assumed that the network outfalls to Thames Water's surface water system.

5.11. Existing runoff rates from the developed site (0.111ha) were determined using the Wallingford Procedure Rational Method for an assumed critical 5-minute storm. Equivalent peak Greenfield Runoff rates for the developed site (0.111ha) were also calculated and are presented in **Table 5-2** below. Full calculations can be found in **Appendix F** and **Appendix G**.

Table 5-2: Existing and Greenfield Discharge rates

Return Period Event	Brownfield (l/s)	Greenfield (l/s)
Q_1	15.68	0.14
Q_{30}	34.88	0.39
Q_{100}	44.40	0.54
Q_{bar}	-	0.17

5.12. In line with the Richmond Strategic Flood Risk Assessment Level 1 (2021) and the London Plan, discharge rates from new developments should aim to achieve Greenfield run-off rates or as close as practically possible. However, greenfield runoff rates for the Site (shown in **Table 5-2** above) are 0.17 l/s which is too low to be practically achieved and would introduce a risk of flooding due to potential for blockages in the flow control device. It is therefore proposed to limit discharge to 2.0 l/s to mitigate the risk of blockages.

5.13. A pre-planning enquiry has been submitted to Thames Water and they have confirmed that they have sufficient capacity within the surface water network to accommodate the flows from the development. Refer to **Appendix H** for the Thames Water correspondence.

Proposed development

5.14. The planning redline boundary equates to approximately 0.165 ha of which 0.069 ha is hardstanding areas. The redevelopment will reduce the impermeable areas across the site through the introduction of communal landscapes areas, and private gardens. Development proposals indicate that the post development layout will include approximately 960m^2 of open landscaping.

5.15. The proposed layout additionally includes 345m^2 of green roof areas and 230m^2 permeable paving. Green roofs have been assumed as 80% impermeable areas as part of the drainage calculations. Surface water runoff from the roof would be reduced by a maximum of 20% as a result of the green roofs. This is in accord with the GRO Green Roof Code (GRO, 2011) and the Guidance for the Planning, Execution and Upkeep of Green Roof Site (FFL, 2002). Comparisons between the existing and proposed hardstanding areas excluding green roofs are shown in **Table 5-3** below.

5.16. The proposals therefore result in a minimum of 25% reduction in impermeable area.

Table 5-3: Existing and proposed hardstanding areas

Site	*Area (ha)*	*Impermeable Area (ha)*	*Permeable Area (ha)*	*% Impermeable*
Pre-Development	0.165	0.111	0.054	67%
Post-Development (excluding green roofs)	0.165	0.069	0.096	42%
Post-Development (including green roofs)	0.165	0.062	0.103	38%

Proposed surface water runoff rates

5.17. The London Plan states that "development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible."

5.18. As such, consideration has been given to **Table 5-2** where the Greenfield rates are reported. It is considered that the Greenfield rates are impracticably low and would cause issues with blockages and maintenance challenges. As such, the lowest reasonably practicable rate of 2.0 l/s is proposed as the discharge rate for all storm events up to the 1 in 100-year plus a 40% allowance for climate change.

5.19. **Table 5-4** below highlights the Existing and Proposed surface water runoff discharge rates for the site under various storm scenarios. A full calculation record is provided in **Appendix G**.

Table 5-4: Existing and Proposed Surface Water Runoff Rates

	Return Period			
	1 in 1 year Discharge Rate	**1 in 30 Year Discharge Rate**	**1 in 100 year Discharge Rate**	**1 in 100 year + 40% Discharge Rate**
Pre Development (l/s)	15.68	34.88	44.40	-
Calculated Greenfield runoff (l/s)	0.14	0.39	0.54	-
Proposed post Development (l/s)	2.00	2.00	2.00	2.00
% Reduction from pre development	87%	94%	95%	-

5.20. In order to achieve the proposed discharge rate of 2.0 l/s, it is proposed that a total storage volume of approximately 9.1m³ will be provided within the proposed geocellular storage.

5.21. An additional 20.7m³ storage will also be available within the 0.3m layer of permeable paving.

5.22. MicroDrainage Network module modelling results show there is no flooding on the Site for the 1 in 100 year including 40% climate change rainfall event. MicroDrainage modelling results are included in **Appendix H**.

5.23. Invert and cover levels should be confirmed on-site and the location of an outfall for the existing system should be explored with a CCTV drainage survey at the detailed design stage. A new connection to the existing system is proposed while no information is available on the existing connection. The proposed rate of discharge and proposed connections are subject to approval by Thames Water and the Lead Local Flood Authority

Surface Water Quality

5.24. The recommended stage of treatment in terms of water quality would be provided through the aforementioned permeable paving. In line with the SuDS Manual C753, Tables 26.2 and 26.3, the pollution hazard and mitigation indices associated with residential roofs are mitigated by the provision of SuDS features.

5.25. Please refer to **Appendix I** for copies of Tables 26.2 and 26.3, the pollution hazard and mitigation indices.

Long Term Storage

5.26. There will be a reduction of impermeable area as a result providing green amenity spaces and green roofs within the development, and as such the runoff volume generated by the developed area will be reduced. Therefore, there is no requirement for Long Term Storage.

5.27. As the development proposals are for apartments, the likelihood of urban creep, without planning, is low and therefore this has not been allowed for.

Exceedance Flows

5.28. As a result of heavy or extreme storm events it is sometimes unavoidable for the capacities of sewers and other drainage systems to be exceeded. Drainage exceedance will occur when the rate of

surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or piped system becomes overloaded, blocked or when the outfall becomes restricted due to flood levels in the receiving water.

5.29. The proposed attenuation features are located towards the lowest lying areas of the site and internal pavement flows away from residential units. The routes will ultimately mimic the current flow routes associated with the existing site as a result of the topography.

Finished floor levels

5.30. It is recommended that finished floor levels be set to 150mm above the existing ground levels to mitigate against possible flooding should the capacity of the drainage system be exceeded.

Future Maintenance

5.31. A management company will be appointed to maintain communal areas, landscaping, and shared SuDS throughout the development.

5.32. All maintenance will be in accord with the best practices and the CIRIA Manual C753. Please refer to **Appendix I** for an overview of the maintenance tasks required.

Proposed Foul Water Drainage Strategy

5.33. The Site currently consists of the Sheldon House, which has 24 residential units. Based on Thames Water's foul flow loadings, the existing peak foul flow rate for the site is calculated to be 1.1 l/s. The development proposes to provide 27 new residential units. Based on Thames Water's foul flow loadings, the proposed peak foul flow rate for the site is calculated to be 1.238 l/s. Refer to **Appendix K** for foul loading calculations.

5.34. It is proposed that foul flows from the development will discharge into the existing Thames Water foul sewer. Refer to the preliminary drainage strategy **drawing no. 2106060-001** provided in **Appendix E**.

5.35. The cumulative peak flow rate for the overall post-developed site (combined foul and surface water flows) is therefore 3.238 l/s (2.00 l/s + 1.238 l/s). Considering the existing site peak combined runoff rate is 45.6 l/s (44.40 + 1.1 l/s), the proposals will result in a reduction of combined flows of 92% from the pre-development scenario for the 1 in 100-year event.

5.36. A pre-planning enquiry has been submitted to Thames Water and they have confirmed that they have sufficient capacity within the foul water network accommodate the flows from the development. Refer to **Appendix J** for the Thames Water correspondence.

6.0 SUMMARY AND CONCLUSIONS

6.1. Ardent Consulting Engineers has been commissioned by RHP Develop Limited to prepare a Flood Risk Statement and Drainage Strategy for a proposed development at the site of the former Sheldon House off Cromwell Road, Teddington.

6.2. This FRA considers the current policy relating to flood risk, including the National Planning Policy Framework, and local policy related to the London Borough of Richmond upon Thames.

6.3. The entire Site is shown to be within Flood Zone 1 therefore at low risk of fluvial/tidal flooding. Therefore, the site does not have to undergo the Sequential and Exception Tests.

6.4. The site is found to be a very low risk of pluvial flooding however the surface water drainage strategy will reduce flood risk by restricting surface water flows in accordance with the London Plan. A sustainable urban drainage system has been designed to incorporate permeable paving and a geocellular attenuation tank. Storm water attenuation is provided for all storms up to and including the 1 in 100-year critical event (including a 40% allowance for climate change). The proposed development results in significant betterment over the predevelopment scenario in terms of a reduction of surface water runoff of 95%.

6.5. It is concluded that the development is at low risk of flooding from other sources including fluvial, tidal, a breach of any nearby reservoir, or sewer flooding. The site is considered to be at medium risk of groundwater flooding.

6.6. It is recommended that finished floor levels be set to 150mm above the existing ground levels to mitigate against possible flooding should the capacity of the drainage system be exceeded, or from groundwater flooding.

6.7. A management company will be appointed to maintain communal spaces and SuDS throughout the life of development. All maintenance will be in accordance with the best practices and the CIRIA Manual C753.

6.8. In conclusion, this document demonstrates that the proposals are consistent with the aims of the NPPF and the Planning Practice Guidance to the NPPF along with the aims of the London Borough of Richmond Local Plan. The Site will not be at significant risk of flooding or increase the flood risk to others.

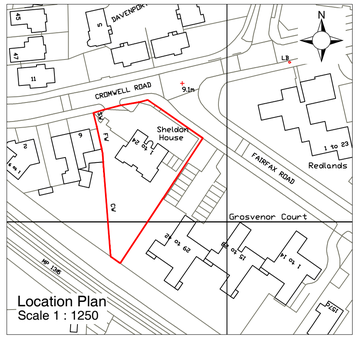
Appendix A

DRAWING 1 - SITE PLAN AS EXISTING

PRINT AT A1 PAPER SIZE

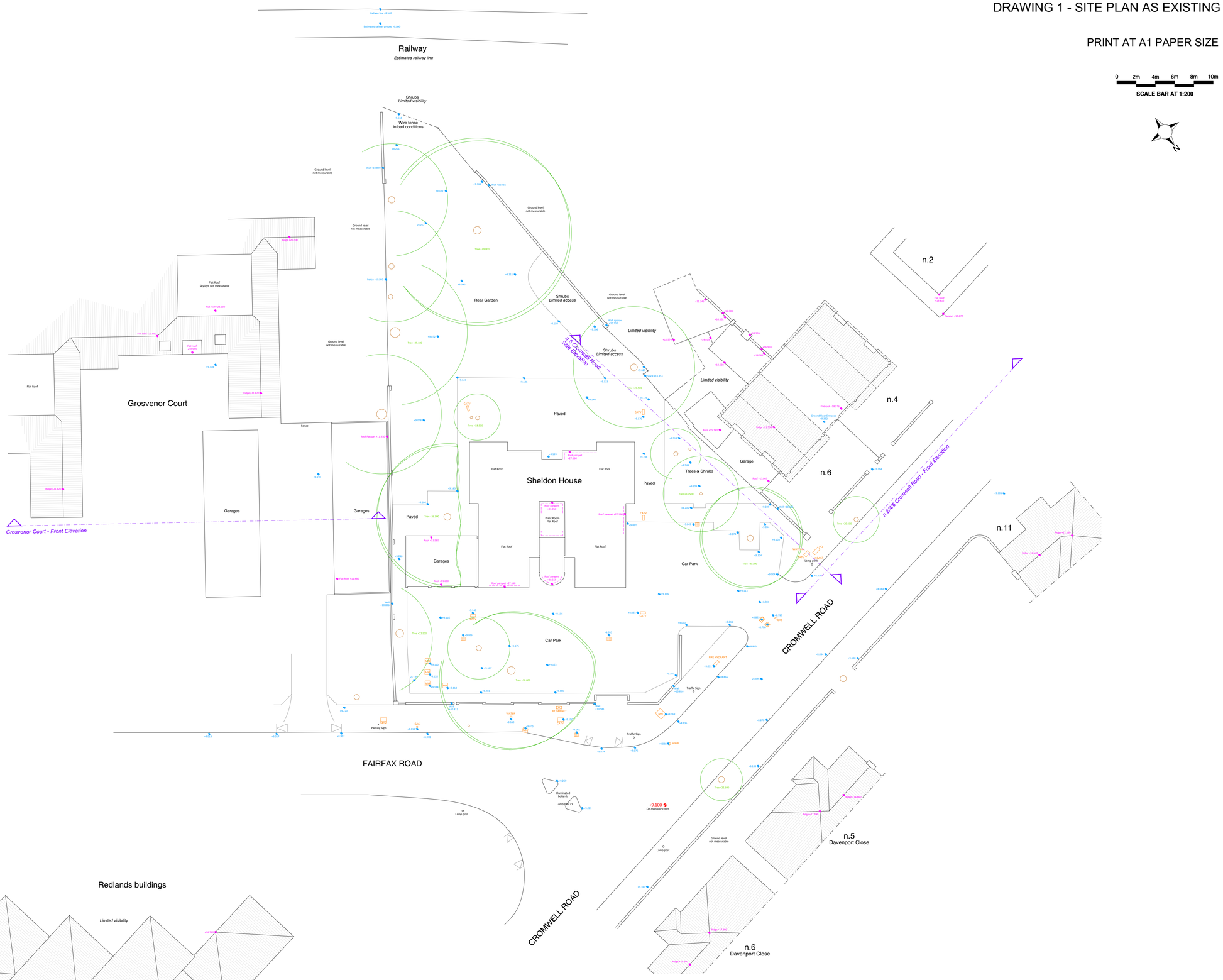
0 2m 4m 6m 8m 10m

SCALE BAR AT 1:200



KEY

- MH — Manhole
- Drain
- +9.093 — Ground level
- +11.580 — Roof level
- +20.800 — Tree height



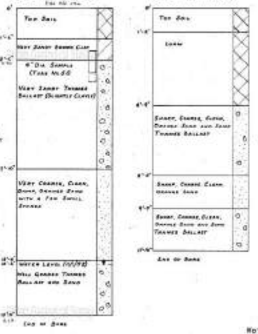
Magnolia Square Limited 57 Rathbone Place Soho London W1T 1JU 020 7479 4855	Client: Clive Chapman Architects	Job Title: Existing Information	Notes: All works to be carried out in accordance with current building regulations. All dimensions / levels to be checked and verified on site before commencing any work and any discrepancies to be reported to the office immediately. This drawing to be read in conjunction with contract documents, project working drawings, specification, all consultants / specialists drawings, details and specification.	Scale: 1:200@A1	Drawn: MZ
	Drawing Title: Site Plan	Site Address: Sheldon House Cromwell Road, Teddington TW11 9EJ		Date: March 2021	Job No: 21100
				Drawing No: 1	Rev:

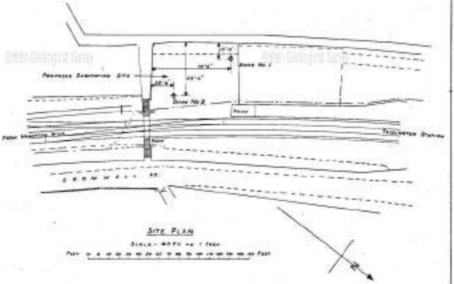
Appendix B

TQ17SE/9-10

TQ17SE/9 1606 7072
BORE No. 1 (8/1/52)

TQ17SE/10 1605 7072
BORE No. 2 (10/1/52)





SITE PLAN

SCALE - 40 FT. TO 1 INCH

NOTES

Site Plan Taken from C.E.'s Drawing No. 10/2673/18
Borings Carried Out by R.A. Abbess

THE RAILWAY EXECUTIVE CIVIL ENGINEER'S DEPT.		SOUTHERN REGION RESEARCH SECTION
REVISED	SOIL MECHANICS INVESTIGATION TEDDINGTON PROPOSED SITE FOR SUBSTATION	
SECT. COPIES C.E.	APPROVED JAN. 1952	SCALES:- 2FT. TO 1 INCH 40FT. TO 1 INCH
R.C.A.C.	[signature]	SECT. No.
SHEET 1 OF 1		C.E.'S No. 10/22620/P18

NGR. 1650 9040 TQ 19 /67

TQ 19 SE 1/5

BOREHOLE SECTION SHEET

LE GRAND, SUTCLIFF & GELL LTD.

Date 19

CONTRACT NAME 75" MAIN. ORDER No. 2755.

Bored for: METROPOLITAN WATER BOARD,

Address:

Address of Site: NEW RIVER ROAD, HORNSEY AVENUE, N.C.

District or Town: CRICKLE ST. MARY'S U.D.C., County: CHURCH ROAD, [illegible]

Standing Water Level FEDDINGTON Ft. Ins. Below Surface Pumping W.L. FLEET BLEEK Ft. Ins. Below Surface

Dia. of Borehole: NIL Inches Yield of Water: G.P.H. O.D. of Site: 29.79 OD+9.08

Particulars of Tubing Inserted: 10

Water Struck (1) Ft. B.S. (2) Ft. B.S. (3) Ft. B.S. (4) Ft. B.S.

Boring Commenced: 20.3.52. Boring Completed: 26.3.52 Ref. T.S.B./S.B.

Special Remarks: Nil

DESCRIPTION OF STRATA	THICKNESS FEET	THICKNESS INCHES	DEPTH BELOW SURFACE FEET	DEPTH BELOW SURFACE INCHES
Clients are requested to examine the samples of the strata submitted, as the descriptions employed below are general terms and responsibility is not accepted for their application to commercial purposes				
No. 52 Boring				
Made Up Ground.	2	6	2	6
Sandy Clay and Stones.	7	6	10	-
Gravel.	7	6	17	6
Gravel & Brown Clay.	1	-	18	6
Gravel.	3	6	22	-
Brown Clay.	3	-	25	-
Blue Clay.	52	-	77	-
Clay Stone.	1	-	78	-
Blue Clay.	62	-	140	-

4" Unisturbed Core Samples taken at 110', 125' and 140' b.c.

LE GRAND, SUTCLIFF & GELL LTD.

Site transferred to 12" and 6" 25 Kejo Riddlesex. SMA 11.7.52.

Rec. 47.52. Total from Surface: 140 - 140 -

Appendix C

agb ENVIRONMENTAL

Phase II Site Investigation Report

Sheldon House, Cromwell Road, Teddington, TW11 9EJ

Client Name: Richmond Housing Partnership

Project Number: P4301.3.0

Date: 3 August 2022

ENABLING DEVELOPMENT

Client:	Richmond Housing Partnership
Site:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Report ref.:	P4301.3.0
Prepared:	H. Gildersleeves MSci FGS J. Gooch BSc FGS
Reviewed:	S. Pike MSc MIEnvSc G. Dowlen MSc CGeol FGS RoGEP EurGeol
Approved:	S. Pike MSc MIEnvSc
Date:	03 August 2022
Version:	Final

1, The Mill, Copley Hill Business Park, Babraham Road, Cambridge, CB22 3GN
Tel: 01223 776 117
www.agbenvironmental.co.uk

Revision	Description	Date
.0	Final	03 August 2022

agb Environmental Ltd

Executive Summary

Client and Site Location

The client, Richmond Housing Partnership, commissioned agb Environmental to complete a Phase II ground investigation at Sheldon House, Cromwell Road, Teddington, TW11 9EJ.

Development Proposals

Development proposals are understood to include the demolition of the existing 7-storey residential block and replacement with a 31-unit, 5-storey residential block with car parking provisions and a communal garden area.

Summary of Encountered Ground Conditions

Made Ground was encountered from surface level in all exploratory hole positions to a maximum depth of 0.60mbgl.

Beneath the Made Ground superficial geology of the Kempton Park Gravel Member was initially encountered as medium dense, becoming dense and then very dense with depth, variably silty, sometimes slightly gravelly sand, to 1.20-3.70mbgl, succeeded by either dense sandy silt (to 1.20-1.40mbgl) or medium dense to very dense, variably silty, sometimes cobbly, gravelly to very gravelly sand (to 1.30-3.10mbgl). In CP01 the Kempton Park Gravel Member continued as dense orange sand with chert gravel and cobbles from 3.70mbgl to a maximum depth of 7.30mbgl.

Underlying the superficial geology was the London Clay Formation, encountered as a firm to stiff grey clay to 9.50mbgl, followed by claystone to 10.40mbgl, and stiff grey clay with occasional claystone patches to 25.00mbgl.

A groundwater seepage was encountered at 2.2mbgl during the formation of borehole CP01. During monitoring groundwater was observed in CP01 between 4.13mbgl and 4.19mbgl.

Summary of Analysis, Screening and Monitoring Results

Elevated concentrations of lead and four congeners of polycyclic aromatic hydrocarbons have been identified in soil samples from four locations at depths between 0.20mbgl and 1.00mbgl. These concentrations exceed the screening values for residential developments, both with and without homegrown produce. Two of the exceedances are from an area within the proposed future soft landscaping.

Elevated concentrations of cadmium, nickel and zinc have been identified in groundwater sampling which exceed water quality standards for surface water. These exceedances were found in the first round of monitoring only.

The exceedances in relation to surface water quality standards are not considered to be significant given the industrial history of the surrounding area and the lack of exceedances during a subsequent round of monitoring and sampling. The closest surface water receptor is a lake in Bushy Park, located approximately 850m south of site. Given the distance to the identified receptor, an unacceptable risk is not considered to be present.

Ground gas monitoring results and subsequent classification indicate CIRIA 665 Characteristic Situation CS-1 is appropriate for the site based on monitoring undertaken.

Based on the conceptual site model and risk assessment there is a considered to be moderate geoenvironmental risk to end users.

It is recommended that delineation through further sampling and testing could be considered in the proposed soft landscaping area to the south of the new building. This may remove the need for soil remediation to be completed, or reduce the area requiring remediation.

In the absence of a delineation exercise remedial works will be required in the proposed new landscaping area to the south of the proposed building to address the risks identified. A remedial strategy must be undertaken and submitted to the Local Planning Authority prior to any of the aforementioned works being undertaken. Any remediation undertaken would then require validation to show that the identified risks have been adequately addressed.

Excavations within the root protection zones of trees on site should have consideration for the NHBC trees standards and root protection areas associated with the existing trees on site and adjacent to site. The Local Planning Authority Tree Officer should be contacted to discuss options.

Based on the soil testing results, waste soils to be removed from site should be classified as **Non-Hazardous**, categorised as 17 05 04 in the List of Waste from WM3. WAC testing was undertaken for completeness and samples failed the Inert Waste WAC limits. Therefore, as per EA guidance '*Dispose of Waste to Landfill*' (published January 2020), excavated soils to be removed off-site meet the requirements for disposal at a landfill for non-hazardous waste.

We would recommend that this report be forwarded to the relevant statutory consultees including the Environment Agency and Local Authority to seek their comments and subsequent approval prior to site works commencing.

Geotechnical Comments

It is anticipated that finished ground levels will be at, or close to, existing ground levels. Should this not be the case then this assessment may need to be reviewed.

Based on the site investigation data and testing currently available, for a 1.0m wide strip/trench fill foundation, bearing on the underlying natural coarse Kempton Park Gravel Member soils at a depth of 1.0m, a design bearing resistance of 300kN/m^{2} is considered appropriate. For a 1.0m wide strip/trench fill foundation at a depth of 2.0m, a design bearing resistance of 350kN/m^2 should be available.

Alternatively for a 2.0m square pad foundation also bearing on the underlying natural coarse Kempton Park Gravel Member soils at a depth of 1.0m, a design bearing resistance of 285kN/m^2 should be available. For a 2.0m square pad foundation at 2.0m, a design bearing resistance of 325kN/m^2 should be available.

The above values should result in total settlements of not more than 25mm, keeping differential settlements within acceptable limits.

If structural loads cannot be accommodated on shallow strip/pad foundations, then it would be necessary to consider a piled design.

Shallow ground conditions on site comprise approximately 600mm of made ground overlying natural coarse soils. Grubbing out of existing foundations and services may disturb the ground

to a deeper and greater extent. At this stage consideration should be given to adopting a suspended floor slab. Whilst the natural coarse soils could be considered a suitable formation for ground bearing slabs following proof rolling any Made Ground/disturbed ground would need to be removed and replaced with selected compacted granular materials. During preparation, the formation should be inspected and any soft or unsuitable materials should be removed and replaced with a suitable compacted granular fill.

A CBR value of 2% is considered suitable for underlying made ground following treatment. It is recommended that once the site has been graded to the appropriate pavement formation level, it is inspected and, if necessary, in situ CBR testing be conducted on the subgrade to confirm the appropriate pavement design.

Analysis indicates an ACEC Class of DS-1 / AC-1 for the Made Ground, underlying Kempton Park Gravel Member and groundwater. An ACEC Class of DS-4/AC-4 is recommended for the London Clay Formation. The London Clay Formation has been designated a design sulphate class of DS-4/AC-4 based on the Total Potential Sulphate values calculated. However, it is recognised that given the depth of the London Clay on site oxidation is unlikely and concrete placed within this strata is therefore also unlikely to be exposed to ground that has been disturbed. A lower design sulphate class could therefore be considered if for example piled foundations were to be placed into the London Clay.

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Appendix 5 CSM Risk Evaluation Methodology

1 Introduction

The client commissioned agb Environmental to complete a Phase II Ground Investigation at Sheldon House, Cromwell Road, Teddington, TW11 9EJ.

1.1 Development Proposals

Development proposals are understood to include the demolition of the existing 7 storey residential block and replacement with a 31-unit, 5 storey residential block with car parking and communal garden areas. Proposal plans are provided in **Appendix 1**.

Prior to demolition the current 7-storey structure should be inspected for presence of asbestos containing materials (ACM). Should such materials be present these will need to be removed by specialist licensed contractors prior to demolition. The current 7-storey structure is likely to be constructed on a piled foundation. Grubbing out of substructures will need to establish the location of any such piles if present to establish if the pile positions conflict with potential pile locations for the proposed 5-storey structure.

1.2 Previous Reports

A Phase I geoenvironmental desk study for the site and the surrounding area was completed by agb Environmental Ltd, report reference P4301.2.0, dated 15th June 2022, and should be read in conjunction with this report.

1.3 Purpose of Investigation

The principal technical objectives of the report were as follows:

- Review of desk study information,
- Establish the ground conditions,
- Undertake analysis of selected soil samples and groundwater samples,
- Provide a Conceptual Site Model (CSM) and risk assessment,
- Provide geoenvironmental recommendations, and
- Provide geotechnical recommendations for foundation design, floor slabs, pavements, excavations, groundwater control and chemical attack.

The report has been formulated in general accordance with BS10175:2011+A2:2017 Investigation into Potentially Contaminated Sites – Code of Practice, Environment Agency LCRM guidance, BS5930:2015 Code of Practice for Site Investigations, and guidance from the National Planning Policy Framework.

2 Site Details

Details regarding the site and anticipated ground conditions extracted from the desk study are provided below.

2.1 Location and Topography

The irregularly shaped site is located in an urban area approximately 275m south-east of Teddington railway station in the suburb of Teddington, within the London Borough of Richmond upon Thames. The site covers an area of approximately 0.16ha and is centred at National Grid Reference 516263 170626. The site is at an elevation of approximately 10mOD, and the surrounding land is generally level. A location plan is presented in **Appendix 1**.

2.2 Site Description

The site fronted and was accessed via Cromwell Road to the north. The hardstanding areas in the north of site were noted to be relatively level. Towards the south west of site the areas of soft landscaping slope gently downwards to the south. The western soft landscaped planted area was raised 0.20m from surface level.

Vegetation comprised the entire southern half of site and consisted of mowed grass, with mature bushes and trees lining the southern boundaries. At the west and north of site is a small soft landscaped, planted area. In the north, and central area of site are large >6m trees. There is a singular large building within the centre of site. It is a red brick apartment block, which is seven storeys, and consists of several garages on the ground floor. The building is relatively square in shape. There are no other structures on site.

Towards the north and west of site are a selection of parking spaces bordering the northern boundary and surrounding the access. It is estimated that 50% of the site consists of permeable soft landscaping and 50% comprising concreted, hard landscaping.

3 Summary of Desk Study Information

Salient information extracted from the desk study report is provided below.

3.1 Anticipated Ground Conditions and Permeability

Based on the BGS mapping the site is underlain by superficial geology of the Kempton Park Gravel Formation, which is in turn underlain by bedrock geology of the London Clay Formation. There are no records of artificial or made ground deposits within 250m of site.

3.2 Geological and Engineering Hazards

According to BGS data, the highest risk on site is very low from running sands, collapsible deposits, and landslides. There is a negligible risk from shrink-swell clays, compressible deposits and the ground dissolution of soluble rocks.

3.3 Radon

The study site is not located within a Radon Affected Area, as less than 1% of properties are above the Action Level. Therefore, no radon protective measures are necessary for new properties or extensions to existing ones as described in Building Research Establishment (BRE) publication BR211.

3.4 Hydrogeology and Hydrology

The superficial geology on site is classed as a Principal aquifer and the bedrock is designated unproductive. There are no abstraction licences noted within 500m of site and no surface water features within 250m of site.

3.5 Summary of Site History

Historical development of site began in 1896 with small structures, which underwent several smaller redevelopments up to the year of 1971, where the site structures were replaced by the apartment block seen during the walkover. Significant residential development and redevelopment of the surrounding site began in 1913 and continued till 1994. The railway 2m south of site has been present since 1840.

4 Preliminary Conceptual Site Model and Risk Assessment

An initial CSM and preliminary assessment of plausible contaminant source-pathway-receptor linkages is presented in this section. It is aimed at identifying possible risks, if any, arising from substances used or deposited on-site, or from other sources of land contamination. Both past and current potentially contaminative land uses have been considered.

4.1 Potential Contaminant Sources

Based on the site walkover and desk study research, the identified potentially contaminative land uses on or within the vicinity of the site are summarised in **Table 4.1**.

Table 4.1 Potential Contaminant Sources

Identified Potentially Contaminative Land Uses / Sources	Distance From Site (approx.)	Potential Contaminants Associated with Identified Sources	Plausible S-P-R Contaminant Linkage?
Made Ground (from previous development on site), potential asbestos containing materials.	On site	Metals, Polycyclic Aromatic Hydrocarbons (PAH), Total Organic Hydrocarbons (TPH), Asbestos Containing Materials (ACMs). Soil gas generation (including CH_4 and CO_2).	**Yes –** given the historical development of the site, a potential contaminant source may be present with the potential to impact site.
Railway Sidings	2m south-west to 19m south-west (1840-present day)	Metals, TPH, PAHs, ACMs, polychlorinated biphenyls (PCBs), acids, alkalis, sulphates.	**Yes –** potential contaminant source is present with the potential to impact site.
Unspecified Pit	41m north (1938)	Metals, TPH, PAHs, ground gasses, vapour.	**No -** Given and the significant time passed, and how relatively small the pit is, it is considered unlikely that there would be any impact to site.
Three historical tanks	137m south (1896) 236m north (1994) 248m north (1934).	TPH, Semi Volatile Organic Compounds (SVOCs), Volatile Organic Compounds (VOCs).	**No -** Given the distance from site and significant time since, it is considered unlikely that there would be any impact to site.
Historical ponds	103-111m south and south-east (1938 and 1945)	Metals, TPH, PAHs, ground gasses, vapour.	**Yes –** Although given the distance from site and significant time since, it is considered that because of its large size it is likely to be a potential contaminant source to site.
Historical and current electricity substation	Historical (53m west 153m east) Current (57m west)	PCBs, Metals, TPH, PAHs.	**No** – given the distance from site combined with the low mobility, hydrophobic nature and high viscosity of PCB oils, it is considered unlikely that there would be any impact to site from historical or recent potential contaminant leaks.

4.2 Pathways

For this assessment, the principal potential pathways for contaminant migration are provided in **Table 4.2**.

Table 4.2 Pathways

Source	Pathway
Soil / dust / fibres	Dermal contact, ingestion and inhalation.
Liquid (including surface water / groundwater)	Dermal contact, ingestion. Leaching, infiltration and migration through groundwater. Preferential pathways such as service trenches.
Harmful ground gases / vapour	Migration through permeable geological strata and preferential pathways. Inhalation, accumulation within confined spaces with subsequent asphyxiation or explosion.

4.3 Receptors

Based on the proposals and the findings of the desk study the identified receptors are described in **Table 4.3**.

Table 4.3 Receptors

Receptor	Detail
Site workers	Site workers are anticipated to include those involved with the construction works and long-term maintenance on site.
End users	Residents and visitors.
Neighbouring sites	Residents, visitors and workers.
Controlled Waters	The underlying superficial deposits is designated a principal aquifer underlain by bedrock geology designated as unproductive. The site is not within a Source Protection Zone and there are no abstractions or water features within 250m of site.
Flora and fauna	Plants and animals that may be affected by proposed development. Soft landscaping is anticipated as part of proposals.
Buildings	The completed building and neighbouring residential structures.
Buried services	Potable water pipes are anticipated as part of proposals.

4.4 Preliminary Conceptual Site Model

The preliminary conceptual site model presented in **Table 4.4** has been derived using the findings of the desk study. The risk evaluation methodology is presented in **Appendix 5**.

Table 4.4 Preliminary Conceptual Site Model

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
On site Made Ground (from previous site development). Potential asbestos containing materials (within on site buildings). *(Metals, TPHs, PAHs, AMCs, PCBs and ground gases/vapour.).*	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Likely	Moderate	Contact is likely between future site users/visitors in shallow soils in the proposed soft landscaping areas of the site, soil/dust tracked back into premises, and potentially from ingestion of produce grown on site. The historical age of various structures and outbuildings is such that the presence of asbestos cannot be discounted. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Likely	Moderate	
		Adjacent users	Medium	Likely	Moderate	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Likely	Moderate	There is no current evidence to suggest that groundwater quality beneath the site is affected by contaminant leaching. The superficial geology is a principal aquifer, and the bedrock geology is designated as unproductive. The site is not located within a SPZ. Any potential contamination could have a significant impact on receptors and cannot be presently ruled out.
	Permeation of water pipes.	Construction materials, future end users	Medium	Likely	Moderate	Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary “barrier pipe” materials (e.g., polyethylene aluminium-polyethylene) may be required by the water supply company.
	Gas Migration and build up within buildings.	Future end users and building structures	Severe	Low likelihood	Moderate	A moderate risk is considered given the potential for Made Ground to be present and from the historical redevelopment which has occurred on site. The high permeability of the underlying superficial geology, potential contaminant migration could impact the site.
	Plant Uptake	Flora and Fauna	Medium	Likely	Moderate	Phytotoxic contamination as a consequence of historical and current land uses is likely due to the made ground from redevelopment at the site.

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
Off site Railway sidings (1840 – present day) *(Metals, TPHs, PAHs, PCBs and ground gases/vapour.).*	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Low likelihood	Moderate / low	Contact is likely between future residential occupiers/visitors in shallow soils in the proposed garden area of the site, soil/dust tracked back into premises, and from ingestion of home grown produce. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Low likelihood	Moderate / low	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Unlikely	Moderate	There is no current evidence to suggest that groundwater quality beneath the site is affected by contaminant leaching. The superficial geology is a principal aquifer, and the bedrock geology is designated as unproductive. The site is not located within a SPZ. Any potential contamination could have a significant impact on receptors and cannot be presently ruled out.
	Permeation of water pipes.	Construction materials, future end users	Medium	Likely	Moderate	Hydrocarbons, especially aromatics and chlorinated solvents, are known to permeate plastic pipes. Provision of water supply pipes and connectors formed from proprietary “barrier pipe” materials (e.g., polyethylene aluminium-polyethylene) may be required by the water supply company.
	Gas Migration and build up within buildings.	Future end users and building structures	Severe	Low likelihood	Moderate	A moderate risk is considered given the significant development surrounding the site and unspecified and infilled pits. The high permeability of the underlying superficial geology, potential contaminant migration could impact the site.
	Plant Uptake	Flora and Fauna	Mild	Low likelihood	Low	Phytotoxic contamination as a consequence of historic and current land uses is unlikely.

5 Fieldwork and Analysis

The works undertaken as part of the site investigation and subsequent analysis of selected samples is summarised below.

5.1 Site Investigation

The locations of the exploratory holes were selected based on available access, the objectives of the investigation and proposed development plans.

Statutory services plans were obtained by agb Environmental. Prior to breaking ground, a cable avoidance tool and signal generator were used to confirm each location was clear of detectable services.

The exploratory hole location plan and fieldwork records are presented in **Appendix 2**. The exploratory holes completed as part of the investigation are detailed below.

5.1.1 Cable Percussive Boreholes

One cable percussive borehole referenced CP01 was drilled between 30th June 2022 and 5th July 2022 to a depth of 25m bgl. Prior to boring CP01, a service inspection pit was excavated to a depth of 1.20mbgl using hand tools to confirm the absence of services. This borehole was advanced in 200mm diameter casing to a depth of 8mbgl, followed by 150mm diameter to a depth of 25mbgl.

Small or bulk disturbed, and undisturbed samples were taken at regular intervals. Standard Penetration Tests (SPTs) were undertaken at intervals to provide an indication of the strength or density of the soil, the results are presented as 'N' values on the borehole logs. Excess spoil was transferred to a skip for off-site disposal by a licensed waste carrier.

5.1.2 Trial Pits

A total of three trial pits, referenced TP01 to TP03, were excavated on 29th June 2022. The trial pits were advanced using a JCB 3CX and completed to depths between 3.00mbgl and 3.10mbgl. Small, and bulk disturbed samples were taken at regular intervals.

5.1.3 Dynamic Sampling Boreholes

A total of 4 dynamic sampling (windowless) boreholes, referenced WS01 to WS04, were formed on 28th June 2022. The boreholes were completed to depths between 1.30mbgl and 2.00mbgl, the density of the deposits preventing deeper penetration. The sampling equipment comprised of a track-mounted rig used to drive successive 1.00m long, lined 90mm to 50mm diameter core sample barrels into the ground. The recovered plastic core barrel 'liners' were split, logged and sub-sampled on-site by an engineer, and the samples, taken at regular intervals throughout the length of the boreholes, were placed in laboratory supplied sealed glass jars or plastic containers prior to being stored in cool boxes during transit to the laboratory. Soil penetration tests (SPTs) were undertaken at regular intervals in the boreholes to provide data regarding the strength or density of the soil, the result of each test is presented as the 'N' value on the borehole logs.

5.1.4 Plate Bearing Tests

Plate bearing tests were completed at six locations, referenced CBR01 to CBR06. The tests were completed either at ground level or at a depth of up to 0.2mbgl, using an 8.5t excavator as a reaction load and a 452mm diameter plate. The results are provided in **Appendix 2**.

5.1.5 Standpipe Installations and Monitoring

Single standpipe installations were placed into boreholes WS02 and WS04; these comprised of 50mm diameter PTFE piping, plain from surface level to 0.50mbgl, slotted between 0.50mbgl and 1.90-2.00mbgl, and installed to a depth of 1.90-2.00mbgl. Once introduced into the ground the slotted section was surrounded by suitable gravel pack, above which a sealing material (bentonite) was used. A rubber bung with a gas tap was placed at the top of the pipework and a flush cover concreted at surface to protect the installation from damage.

A single standpipe installation was placed in CP01, comprised of 50mm diameter PTFE piping, plain from surface level to 1.00mbgl, slotted between 1.00mbgl and 10.00mbgl, and installed to a depth of 10.00mbgl. Arisings were placed into the borehole between 25.00mbgl and 12.00mbgl, above which a bentonite seal was placed between 12.00mbgl and 10.00mbgl prior to the introduction of the standpipe. Once introduced into the ground the slotted section was surrounded by suitable gravel pack, above which a sealing material (bentonite) was used. A rubber bung with a gas tap was placed at the top of the pipework and a flush cover concreted at surface to protect the installation from damage.

The standpipes were monitored on two occasions between 11th July and 21st July 2022. The ground gas flow was monitored for a period of up to two minutes, the concentration of volatile organic compounds (VOCs) was monitored for a period of up to three minutes and the concentrations of ground gases including methane, carbon dioxide, hydrogen sulphide and carbon monoxide were monitored for up to five minutes.

The groundwater was sampled and monitored from the deep install of CP01. The monitoring results are presented in **Appendix 3**.

5.2 Laboratory Analysis

The scheduled chemical analysis and number of samples tested is summarised **Table 5.1**; the scheduled geotechnical laboratory testing is summarised in **Table 5.2**. The results are presented in **Appendix 4**.

Table 5.1 Summary of Scheduled Contamination Testing

Analysis	**No. of Samples Tested**	
	Soil	*Groundwater*
Metals	6	2
Speciated polycyclic aromatic hydrocarbons (PAHs) (USEPA 16 – PAHs)	6	2
Total petroleum hydrocarbons (CWG Aromatic/Aliphatic Split)	6	2
BTEXMTBE	6	2
Asbestos screening	6	-
pH	16	2
Soil organic matter (SOM)	6	-
Polychlorinated Biphenyls	1	-
Total Sulphate (as SO4)	10	-
Total Sulphur	10	-
Water Soluble Sulphate (SO4)	10	2
Waste Acceptance Criteria Testing (BS EN 12457/3)	2	-

Table 5.2 Summary of Scheduled Geotechnical Testing

Test	No. of Soil Samples Tested
Plasticity index	10
Natural Water Content	10
Particle Size Distribution	3
Triaxial Test	4

6 Ground Conditions

The encountered ground conditions are summarised below.

6.1 Encountered Ground Conditions

The ground conditions encountered are summarised in **Table 6.1** and discussed below.

Table 6.1 Summary of Encountered Ground Conditions

Stratum	Location	Surface Depth (mbgl)	Base Depth (mbgl)	Thickness (m)
Made Ground	All positions	0.00	0.30 to 0.60	0.30 to 0.60
Kempton Park Gravel Member	All positions	0.30-0.60	≥1.30* to 7.30	≥0.70 to 6.90
London Clay Formation	CP01	7.30	≥25.00*	≥17.70
Groundwater	Groundwater seepage was noted in CP01 at 2.2mbgl during the intrusive site investigation works. No groundwater was encountered in the dynamic sampling boreholes or trial pits. During monitoring, groundwater was observed between 4.12mbgl and 4.19mbgl in borehole CP01; the dynamic sampling boreholes were dry.			

* base of stratum not proven at all borehole locations

6.1.1 Made Ground

Made Ground was encountered from surface level in all exploratory hole positions.

This was encountered from surface level as concrete with 7-8mm diameter rebar in positions CP01, WS01 and WS04 to a maximum depth of 0.20mbgl. Underlying the concrete in these positions was brown or dark grey gravelly sand, sand and gravel, or brick and concrete rubble to depths between 0.30 and 0.60mbgl. Gravel comprised brick, chert, limestone and concrete with rare clinker.

In position TP02, the Made Ground was encountered from surface level to a maximum depth of 0.30mbgl as dark brown silty sand. Sand was fine.

In positions TP01, TP03, WS02 and WS03, the Made Ground was encountered from surface level as dark brown, sometimes slightly gravelly, slightly silty to silty sand or slightly gravelly to gravelly sandy silt. Gravel was brick, chert and concrete with occasional brick, glass, clinker and porcelain. Occasional concrete and chert cobbles. Glass, metal and porcelain were notably abundant in the Made Ground at WS03 and concrete was abundant in TP03.

The base of the Made Ground was proven to depths between 0.30mbgl and 0.40mbgl in positions CP01, TP01-TP03 and WS04, and to a maximum depth of 0.60mbgl in positions WS01, WS02 and WS03.

6.1.2 Kempton Park Gravel Member

Beneath the Made Ground in all positions the natural geology was initially encountered as medium dense to very dense, brown, yellowish brown or dark grey, sometimes slightly silty to very silty, sometimes slightly gravelly sand to depths between 1.20mbgl and 3.70mbgl. Gravel was chert, generally rounded or recovered fractured. The sand or slightly gravelly sand was succeeded by stiff yellowish brown, sometimes gravelly, sandy silty clay in positions TP03, WS02 and WS03 to depths between 1.20mbgl and 1.40mbgl. The sand became medium dense to very dense brown or yellowish brown, sometimes slightly silty to silty, sometimes cobbly, gravelly to very gravelly, sand from 1.20-1.60mbgl to the base of most positions at

≥1.30mbgl to ≥3.10mbgl. In CP01 the brown cobbly gravelly fine sand was succeeded by orange sand with some chert gravel and cobbles from 3.70mbgl to a maximum depth of 7.30mbgl.

These strata are initially fine sand-dominated, generally becoming gravelly to very gravelly at 1.20-1.60mbgl, and are considered representative of the Kempton Park Gravel Member, which is shown on the BGS mapping to underlie the site. All positions except CP01 were completed in the Kempton Park Gravel Member between 1.30mbgl and 3.10mbgl.

6.1.3 London Clay Formation

The London Clay Formation was encountered beneath the Kempton Park Gravel Member in CP01 only, at a depth of 7.30mbgl. This stratum was encountered as a firm to stiff grey clay between 7.30mbgl and 9.50mbgl, followed by a claystone from 9.50mbgl to 10.40mbgl, overlying a stiff to very stiff grey clay with occasional patches of claystone between 10.40mbgl and 25.00mbgl.

CP01 was completed in the London Clay Formation at 25.00mbgl; the base of the stratum was not proven.

6.1.4 Groundwater

Groundwater was not observed during the formation of the dynamic sampling boreholes or the trial pits. A groundwater seepage was noted in cable percussive borehole CP01 at 2.2mbgl.

During monitoring, groundwater was observed in CP01 between 4.12mbgl and 4.19mbgl.

6.1.5 Visual and Olfactory Evidence

During the site investigation works and subsequent monitoring there were no visual or olfactory indications of gross contamination in soils or groundwater. The presence of Made Ground across the site could be a potential indicator of the presence of contaminants in soil.

7 Chemical Laboratory Test Results and Monitoring

The results of chemical laboratory testing and ground gas monitoring are detailed in the following section.

7.1 Soil Analysis

Based on the proposed end use as a residential development, with the incorporation of soft landscaping, the variability of Made Ground encountered and the results of soil organic matter content testing results, the results of chemical laboratory testing of soil samples for inorganic and organic compounds have been compared against screening criteria for residential with homegrown produce end use with 1.0% soil organic matter content as this is the most appropriate generic assessment criteria (GAC) applicable. The screening criteria hierarchy used is as follows:

- Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) Suitable for Use Levels (S4ULs).
- Department for Environment Food and Rural Affairs (Defra) Category 4 Screening Levels (C4SLs).
- Contaminated Land: Applications in Real Environments (CL:AIRE) soil generic assessment criteria (GACs).
- Environment Agency: Soil Guideline Values (SGVs)

Screening levels for certain organic contaminants have been selected based on laboratory testing for soil organic matter (SOM) content. A conservative SOM of 1% has been considered appropriate for this risk assessment based on the range recorded by laboratory testing in Made Ground samples.

7.2 Groundwater Analysis

The superficial geology on site is classed as a Principal aquifer and the bedrock is designated unproductive. There are no abstraction licences noted within 500m of site and no surface water features within 250m of site.

In order to assess the risk to surface water from potential contaminants, the results of groundwater analysis have been compared to water quality standards provided in:

- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (WFD, 2015).
- The Water Supply (Water Quality) Regulations 2016 (WSR).
- WHO - Guidelines for Drinking-Water Quality, Fourth Edition Incorporating the First Addendum (WHO, 2017).

7.3 Aggressive Ground

The results of testing for aggressive ground conditions have been classified using values provided in BRE Special Digest 1:2005: Concrete in aggressive ground.

7.4 Ground Gas Monitoring

Where applicable the results of ground gas and volatile organic compound (VOC) monitoring have been compared to:

- CIRIA 665: Assessing risks posed by hazardous ground gases to buildings.

- BS 8485:2015: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- HSE EH40/2005 Workplace exposure limits.

7.5 Soil Analysis and Screening Results

Table 7.1 Results of Laboratory Analysis for Metals

Determinand *Metals*	**Determinand / Concentration Range (mg/kg)**		**Screening Values for Residential with Homegrown Produce Land Use (mg/kg)**		**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*	*C4SLs*		
Arsenic	9	26	37	-	0	None elevated
Cadmium	< 0.2	0.5	11	-	0	None elevated
Chromium (III)	13	19	910	-	0	None elevated
Chromium (VI)	< 2	< 2	6	-	0	None elevated
Copper	7	63	2400	-	0	None elevated
Lead	16	635	-	210	3	CP01– 0.30m TP01 – 0.20m WS03 – 0.30m
Mercury	< 1	< 1	40	-	0	None elevated
Nickel	11	16	130	-	0	None elevated
Selenium	< 3	< 3	250	-	0	None elevated
Zinc	40	589	3,700	-	0	None elevated

Table 7.2 Results of Laboratory Analysis for Polycyclic Aromatic Hydrocarbons

Determinand *PAHs*	**Concentration Range (mg/kg)**		**Screening Values for Residential with Homegrown Produce Land Use (mg/kg)**		**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*	*C4SLs*		
			1% som			
Naphthalene	< 0.1	0.12	2.3	-	0	None elevated
Acenaphthylene	< 0.1	1.15	170	-	0	None elevated
Acenaphthene	< 0.1	0.35	210	-	0	None elevated
Fluorene	< 0.1	1.65	170	-	0	None elevated
Phenanthrene	< 0.1	18	95	-	0	None elevated
Anthracene	< 0.1	4.44	2,400	-	0	None elevated
Fluoranthene	< 0.1	28.7	280	-	0	None elevated
Pyrene	< 0.1	25.1	620	-	0	None elevated
Benzo[a]anthracene	< 0.1	13.3	7.2	-	1	WS02 – 1.00m
Chrysene	< 0.1	11	15	-	0	None elevated
Benzo[b]fluoranthene	< 0.1	11.5	2.6	-	1	WS02 – 1.00m
Benzo[k]fluoranthene	< 0.1	4.24	77	-	0	None elevated
Benzo[a]pyrene	< 0.1	12.6	2.2	10	1	WS02 – 1.00m
Indeno[123-cd]pyrene	< 0.1	7.38	27	-	0	None elevated
Dibenzo[ah]anthracene	< 0.1	2.07	0.24	-	3	TP01 – 0.20m WS02 – 1.00m WS03 – 0.30m
Benzo[ghi]perylene	< 0.1	6.37	320	-	0	None elevated
Total PAH	< 1.6	148	-	-	-	-

Table 7.3 Results of Laboratory Analysis for Speciated Total Petroleum Hydrocarbons

Determinand *Petroleum Hydrocarbons*	**Determinand Concentration Range (mg/kg)**		**Screening Values for Residential with Homegrown Produce Land Use (mg/kg)**	**No. of Samples with Elevated Concentrations**	**Samples with Elevated Concentrations**
			S4ULs		
Speciated - Aliphatic	*Minimum*	*Maximum*	*1% som*		
>C5-C6	< 0.01	< 0.01	42	0	None elevated
>C6-C8	< 0.05	< 0.05	100	0	None elevated
>C8-C10	< 2	< 2	27	0	None elevated
>C10-C12	< 2	< 2	130	0	None elevated
>C12-C16	< 3	< 3	1100	0	None elevated
>C16-C34	< 13	< 13	65000	0	None elevated
Aliphatic C5-C34	< 21	< 21	-	-	-
Speciated - Aromatic	*Minimum*	*Maximum*	*1% som*		
>C5-7	< 0.01	< 0.01	70	0	None elevated
>C7-8	< 0.05	< 0.05	130	0	None elevated
>C8-10	< 2	< 2	34	0	None elevated
>C10-12	< 2	< 2	74	0	None elevated
>C12-16	< 2	5	140	0	None elevated
>C16-21	< 3	52	260	0	None elevated
>C21-35	< 10	114	1,100	0	None elevated
Aromatic C5-35	< 21	171	-	-	-

Table 7.4 Results of Laboratory Analysis for BTEX and MTBE

Determinand *BTEX*	**Concentration Range (mg/kg)**		**Screening Values for Residential with Homegrown Produce Land Use (mg/kg)**	**No. of Samples with Elevated Concentration**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*S4ULs*		
			1% som		
Benzene	< 0.002	< 0.002	0.087	0	None elevated
Toluene	< 0.005	< 0.005	130	0	None elevated
Ethylbenzene	< 0.002	< 0.002	47	0	None elevated
o-xylene	< 0.002	< 0.002	60	0	None elevated
m-xylene	< 0.002	< 0.002	59	0	None elevated
p-xylene	< 0.002	< 0.002	56	0	None elevated
Determinand *MTBE*	*Minimum*	*Maximum*	*GACs*	**No. of Samples with Elevated Concentration**	**Samples with Elevated Concentrations**
			1% som		
MTBE	< 0.005	< 0.005	49	0	None elevated

Table 7.5 PCB Analysis

Determinand	**Concentration Range (mg/kg)**		**Screening Values for Residential with Homegrown Produce Land Use (mg/kg)**	**No. of Samples with Elevated Concentration**	**Samples with Elevated Concentrations**
	Minimum	*Maximum*	*EA SGVs*		
Total PCB (12 congeners)	< 0.1	< 0.1	8	0	-

Table 7.6 Asbestos Screening

Determinand	**Screening Result**	**Asbestos Matrix**	**Asbestos Type**	**Quantification (%)**	**Samples with Detected Asbestos**
Asbestos	Not Detected	-	-	-	-

7.6 Groundwater Analysis and Screening Results

Table 7.7 Summary of Groundwater Analysis Results

Determinand	Determinand Concentration (ug/l)		Threshold Value (ug/l)			No. of Samples with Elevated Concentrations	Location of Samples with Elevated Concentrations
	Minimum	*Maximum*	*Surface Water*	*Drinking Water*	*Odour or Taste Threshold*		
Inorganic							
Arsenic	< 5	< 5	50 [a]	10 [g]	-	0	None elevated
Cadmium	< 0.4	0.4	0.08 to 0.25 [a,b]	5 [g]	-	1	CP01 – 4.15m
Chromium (III)	< 5	< 5	4.7 [a]	50 [g]	-	0	Threshold value is less than limit of detection, but no indication of contaminant impact of either soils or groundwaters.
Chromium (VI)	< 20	< 20	3.4 [a]	-	-	0	Threshold value is less than limit of detection, but no indication of contaminant impact of either soils or groundwaters.
Copper	< 5	< 5	1 [a, i]	2,000 [g]	5,000 [l]	0	Threshold value is less than limit of detection, but no indication of contaminant impact of either soils or groundwaters.
Lead	< 5	< 5	1.2 [a,i]	10 [g]	-	0	Threshold value is less than limit of detection, but no indication of significant contaminant impact of either soils or groundwaters.
Mercury	< 0.05	< 0.05	0.07 [b]	1 [g]	-	0	None elevated
Nickel	< 5	18	4 a, [i]	20 [g]	-	1	CP01 – 4.15m
Selenium	< 5	< 5		10 [g]	-	0	None elevated
Zinc	< 2	105	10.9 [a, i, j]		-	1	CP01 – 4.15m
Polycyclic Aromatic Hydrocarbons							
Naphthalene	< 0.01	< 0.01	2 [a]	0.075 [d]	-	0	None elevated
Acenaphthylene	< 0.01	< 0.01			-	0	None elevated
Acenaphthene	< 0.01	< 0.01			-	0	None elevated

Determinand	Determinand Concentration (ug/l)		Threshold Value (ug/l)			No. of Samples with Elevated Concentrations	Location of Samples with Elevated Concentrations
	Minimum	*Maximum*	*Surface Water*	*Drinking Water*	*Odour or Taste Threshold*		
Fluorene	< 0.01	< 0.01			-	0	None elevated
Phenanthrene	< 0.01	< 0.01			-	0	None elevated
Anthracene	< 0.01	< 0.01	0.1 a		-	0	None elevated
Fluoranthene	< 0.01	< 0.01	0.0063 [a]	0.075 [d]	-	0	Threshold value is less than limit of detection, but no indication of contaminant impact of either soils or groundwaters.
Pyrene	< 0.01	< 0.01			-	0	None elevated
Benzo[a]anthracene	< 0.01	< 0.01			-	0	None elevated
Chrysene	< 0.01	< 0.01			-	0	None elevated
Benzo[b]fluoranthene	< 0.01	< 0.01	0.017 [b]	0.075 [d]	-	0	None elevated
Benzo[k]fluoranthene	< 0.01	< 0.01	0.017 [b]		-	0	None elevated
Benzo[a]pyrene	< 0.01	< 0.01	0.00017 [a]	0.01 [g]	-	0	Threshold value is less than limit of detection, but no indication of significant contaminant impact of either soils or groundwaters.
Indeno[123-cd]pyrene	< 0.01	< 0.01			-	0	None elevated
Dibenzo[ah]anthracene	< 0.01	< 0.01			-	0	None elevated
Benzo[ghi]perylene	< 0.008	< 0.008	0.0082 [b]		-	0	None elevated
Total PAH	< 0.16	< 0.16		0.1 [g]	-	0	Threshold value is less than limit of detection, but no indication of contaminant impact of either soils or groundwaters.
BTEX							
Benzene	< 1	< 1	10 [a]	1 [g]	-	0	None elevated
Toluene	< 5	< 5	74 [a]	700 [h]	40 [l]	0	None elevated
Ethylbenzene	< 5	< 5	-	300 [h]	72 [l]	0	None elevated
Xylenes	< 15	< 15	30 [f]	500 [h]	300 [l]	0	None elevated

Determinand	Determinand Concentration (ug/l)		Threshold Value (ug/l)			No. of Samples with Elevated Concentrations	Location of Samples with Elevated Concentrations
	Minimum	*Maximum*	*Surface Water*	*Drinking Water*	*Odour or Taste Threshold*		
MTBE	< 10	< 10	-	-	15 [m]	0	None elevated
Petroleum Hydrocarbons							
Aliphatic >EC5-6	< 10	< 10	-	15000 [n]	-	0	None elevated
Aliphatic>EC6-8	< 10	< 10	-	15000 [n]	-	0	None elevated
Aliphatic>EC8-10	< 10	< 10	-	300 [n]	-	0	None elevated
Aliphatic>EC10-12	< 10	< 10	-	300 [n]	-	0	None elevated
Aliphatic>EC12-16	< 10	< 10	-	300 [n]	-	0	None elevated
Aliphatic>EC16-35	< 10	< 10	-	-	-	0	None elevated
Aromatic >EC5-7	< 10	< 10	-	10 [n]	-	0	None elevated
Aromatic >EC7-8	< 10	< 10	-	700 [n]	-	0	None elevated
Aromatic >EC8-10	< 10	< 10	-	300 [n]	-	0	None elevated
Aromatic >EC10-12	< 10	< 10	-	90 [n]	-	0	None elevated
Aromatic >EC12-16	< 10	< 10	-	90 [n]	-	0	None elevated
Aromatic >EC16-21	< 10	< 10	-	90 [n]	-	0	None elevated
Aromatic >EC21-35	< 10	< 10	-	90 [n]	-	0	None elevated
TPH	< 140	< 140	-	-	10 [l, m]	0	None elevated

a - Water Framework Directive (Standards and Classification), 2015 - EQS Value for Rivers based on long term mean or an annual average.

b - Water Framework Directive - Maximum Allowable Concentration for Rivers

c - Water Framework Directive - Groundwater value where end receptor is surface water

d - Water Framework Directive - Groundwater value where end receptor is drinking water supply

e - Water Framework Directive - General quality of groundwater value

f - Environment Agency "operational" target

g - Water Supply Regulations

h - WHO, 2017 - Drinking Water Standards

i - bioavailable component

j - plus Ambient Background Concentration (dissolved)

k - hardness dependant

l - WHO, 2017 - lower bound taste threshold

m - WHO, 2017 - lower bound odour threshold

n - WHO, 2008 Drinking Water Standards (adopted by CL:AIRE)

7.7 Aggressive Ground Analysis

Table 7.8 Summary of Aggressive Ground Analysis

Stratum	Determinand					DS / ACEC Class
	Total sulphate (%)	W/S sulphate SO_4 (mg/l)	Total sulphur (%)	pH	Total Potential Sulphate	
Made Ground	0.03	< 10	< 0.02	7	-	DS-1 / AC-1
Kempton Park Gravel Member	0.03–0.06	13–227	< 0.02 – 0.02	7.7 - 8.5	-	DS-1 / AC-1
London Clay Formation	0.05 -0.06	108-150	0.28 – 0.65	6.8 – 8.9	0.84-1.95	DS-4 / AC-4
Groundwater	-	103-105	-	7.3	-	DS-1 / AC-1

7.8 Ground Gas Monitoring Results

Table 7.9 Summary of Ground Gas Monitoring Results

Date	Location	CO_2 (%)		CH_4 (%)		O_2 (%)		Flow (Max. l/hr.)	Atmos. Pres. (mb)
		Min	Max	Min	Max	Min	Max		
11.07.2022	CP01	2.9	3.4	0.0	0.0	13.2	16.3	0.0	1022 (falling)
11.07.2022	WS02	1.3	2.2	0.0	0.0	18.9	19.6	0.0	1023 (falling)
11.07.2022	WS04	2.2	3.3	0.0	0.0	17.7	19.3	0.0	1023 (falling)
21.07.2022	CP01	5.0	5.1	0.0	0.0	13.2	14.2	0.0	1022 (falling)
21.07.2022	WS02	1.5	2.1	0.0	0.0	19.2	19.6	0.0	1021 (falling)
21.07.2022	WS04	0.1	3.6	0.0	0.0	17.9	20.6	0.0	1021 (falling)

Table 7.10 Gas Screening Values for Carbon Dioxide and Methane

Peak Flow Rate (l/hr)	Worst Case CO_2 (%)	CO_2 GSV	Worst Case CH_4 (%)	CH_4 GSV	CIRIA 665 Characteristic Situation
<0.1	5.1	0.0051l/hr CO_2	<0.1	0.0001l/hr CH_4	GSV = CS-1 Max recorded values = CS-1*

Table 7.11 Workplace Exposure Limits

Location	Recorded Concentration (ppm)					
	Carbon monoxide		Hydrogen sulphide		Liquefied Petroleum Gas (VOCs)	
	Min	Max	Min	Max	Min	Max
All Boreholes	1	4	1	4	<0.1	<0.1
HSE Workplace Exposure Limits (ppm)	*Long Term*	*Short Term*	*Long Term*	*Short Term*	*Long Term*	*Short Term*
	30	200	5	10	1000	1250
Locations with Elevated Concentrations	None elevated.		None elevated.		None elevated.	

8 Updated Risk Assessment

Discussion of analysis, screening and monitoring results, and an updated qualitative risk assessment are provided below.

8.1 Discussion of Results, Screening and Monitoring Results

The soil and groundwater screening and the results of the ground gas monitoring visits are summarised below in **Table 8.1**, **Table 8.2** and **Table 8.3**.

Soil

Elevated concentrations of lead and four congeners of polycyclic aromatic hydrocarbons (PAH), namely benzo[a]anthracene, benzo[b]fluoranthene, benzo[a]pyrene and dibenzo[ah]anthracene, have been identified within soils across four exploratory hole positions, which exceed the screening criteria for residential developments with homegrown produce. Additional comparison has been undertaken below against screening criteria for residential developments without homegrown produce end use. The results are presented below in **Table 8.1**.

Table 8.1 Summary of soil screening value comparisons for samples with screening threshold exceedances.

Determinand	**Samples with Exceedance and Location for Screening Values (1% SOM)**	
	Residential with homegrown produce	*Residential without homegrown produce*
Lead	CP01 – 0.30m TP01 – 0.20m WS03 – 0.30m	CP01 – 0.30m TP01 – 0.20m WS03 – 0.30m
Benzo[a]anthracene	WS02 – 1.00m	WS02 – 1.00m
Benzo[b]fluoranthene	WS02 – 1.00m WS03 – 0.30m	WS02 – 1.00m WS03 – 0.30m
Benzo[a]pyrene	WS02 – 1.00m WS03 – 0.30m	WS02 – 1.00m WS03 – 0.30m
Dibenzo[ah]anthracene	TP01 – 0.20m WS02 – 1.00m WS03 – 0.30m	WS02 – 1.00m WS03 – 0.30m

Positions CP01 and WS02 are below the footprint of the proposed building on site; position TP01 is beneath proposed parking and WS03 beneath proposed soft landscaping on site. These results indicate that the Made Ground is not suitable for soft landscaped areas on site which may be accessed by residents. The sample from WS02 at 1.00m is from the natural soil underlying the Made Ground. It is noted that this has the potential to be reworked soil and that the PAH exceedances are in similar congeners to the shallow Made Ground soil from WS03.

Groundwater

Table 8.2 Groundwater Screening Summary

Determinand	Samples with Exceedance
Cadmium	CP01 – 4.15m. Exceeding surface water criteria.
Nickel	
Zinc	

Elevated concentrations of cadmium, nickel and zinc have been identified in the first round of groundwater sampling underlying the site which exceed water quality standards for surface water. No source has been identified within shallow Made Ground soils on site.

The exceedances in relation to surface water quality standards concentrations are not considered to be significant given the industrial history of the surrounding area and the lack of exceedances during a subsequent round of monitoring and sampling. The closest surface water receptor is a lake in Bushy Park, located approximately 850m south of site. Given the distance to this receptor an unacceptable risk is not considered to be present..

Ground Gas

Table 8.3 Summary of Ground Gas Monitoring

Item	Result
Characteristic Situation	CS-1 (CIRIA C665)
Workplace Exposure Limits	None elevated.

Ground gas monitoring was undertaken during two visits between 11th July and 21st July 2022. Based upon the gas screening values, Characteristic Situation 1 is considered appropriate for the site. The maximum recorded carbon dioxide gas concentration is slightly above the 5% threshold between CS-1 and CS-2. However, given that no positive flow rates have been encountered from any of the boreholes monitored on site and the very marginal exceedance of the 5% threshold, CS-1 is still considered appropriate.

Based on the information discussed above, Characteristic Situation (CS) 1 is identified as the appropriate ground gas regime for the site.

9 Waste Classification

Excavated soil from the construction works intended for disposal is required to be assessed for hazardous properties prior to disposal. The soil would be classified as either:

- Hazardous
- Non hazardous
- Inert

9.1 Soil Waste Classification

An assessment of the chemical data has been undertaken with respect to the Environment Agency's (EA) Technical Guidance Document WM3 (2021) '*Waste Classification- Guidance on the classification and assessment of waste*' (1st Ed. V1.2.GB) to determine whether arisings from the site, if intended for disposal to landfill, possess hazardous properties and therefore would require disposal to a hazardous landfill or an alternative facility that deals with designated Hazardous Waste. It is assumed the chemical data obtained is representative of conditions of the soils at the site.

A waste classification assessment was undertaken on 6no. soil samples using HazWasteOnline™ software. The Waste Classification Report is presented in **Appendix 4**. All six of the samples classify as non-hazardous.

Based on the soil testing results, waste soils to be removed from site should be classified as **Non-Hazardous**, categorised as 17 05 04 in the List of Waste from WM3.

9.2 Soil Waste Disposal

The Landfill Directive, introduced to the UK via the Landfill Regulations (England and Wales) 2002 aims to reduce reliance on landfill as a disposal option. The Regulations include updated waste assessment criteria (WAC) as limit values for waste destined to various classes of landfill.

WAC testing was undertaken on two soil samples, from WS02 (1.00m) and WS03 (0.30m). The sample from WS02 passed the Inert Waste WAC limits, but the sample from WS03 failed the Inert Waste WAC limit from antimony. Therefore, as per EA guidance '*Dispose of Waste to Landfill*' (published January 2020), excavated soils to be removed off-site meet the requirements for disposal at a landfill for non-hazardous waste. The WAC testing results are presented in **Appendix 4**.

The developer has a statutory responsibility under the Duty of Care Regulations of the Environmental Protection Act 1990 to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner.

To comply with the Duty of Care all wastes taken off site, in solid or liquid form, must be handled by a registered waste carrier and be accompanied by a consignment note that describes the waste.

10 Updated Conceptual Site Model and Qualitative Risk Assessment

The updated assessment of plausible contaminant linkages based on the results of the investigation and a summary of the potential geo-environmental risks associated with the site and in the context of the proposed development is provided in **Table 10.1**. The CSM risk evaluation methodology is presented in **Appendix 5.**

Table 10.1 Updated Qualitative Risk Assessment

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
On site Made Ground (from previous site development). Potential asbestos containing materials (within on site buildings). *(Metals, TPHs, PAHs, AMCs, PCBs and ground gases/vapour.).*	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Likely	Moderate	Contact is likely between future site users/visitors in shallow soils in the proposed soft landscaping areas of the site, soil/dust tracked back into premises, and potentially from ingestion of produce grown on site. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Likely	Moderate	
		Adjacent users	Medium	Unlikely	Low	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Unlikely	Low	Groundwater screening indicates exceedances for heavy metals beneath the site in the first water sample tested. No on-site contamination source has been identified in the Made Ground, and subsequent monitoring did not identify chemical exceedances in groundwater. Given the distance to the nearest identified surface water feature and no abstraction licenses within 500m, an unacceptable risk is not considered to be present.
	Permeation of water pipes.	Construction materials, future end users	Medium	Low likelihood	Moderate / low	A moderate to low likelihood of potential hydrocarbon permeation of pipes is considered to site based upon the results of soil and groundwater screening. The results should be supplied to the water supply company to determine the appropriate pipework for use on site.
	Gas Migration and build up within buildings.	Future end users and building structures	Severe	Unlikely	Moderate / low	Based upon the results of ground gas monitoring, a moderate to low risk is considered to site from ground gasses. Characteristic Situation CS-1 has been considered appropriate for the site based on the ground gas monitoring results.
	Plant Uptake	Flora and Fauna	Mild	Low likelihood	Low	Phytotoxic contamination as a consequence of historic and current land uses is unlikely.

Source	Pathway	Receptor	Consequence	Probability	Potential Risk	Detail
Off site Railway sidings (1840 – present day) *(Metals, TPHs, PAHs, PCBs and ground gases/vapour.).*	Dermal contact, ingestion and inhalation of contaminated soil, dust and/or fibres	End users	Medium	Low likelihood	Moderate / low	Contact is likely between future residential occupiers/visitors in shallow soils in the proposed garden area of the site, soil/dust tracked back into premises, and from ingestion of home grown produce. Future site workers are likely to come into direct contact with soils during groundworks. Safe working practices should be implemented, and appropriate personal protective equipment (PPE) should be used to mitigate any potential risk.
		Site workers	Medium	Low likelihood	Moderate / low	
	Leaching / infiltration through soils and migration via groundwater or soil pore moisture.	Controlled waters	Medium	Unlikely	Low	Groundwater screening indicates exceedances for heavy metals beneath the site in the first water sample tested. These may have come from an off-site source. No on-site contamination source has been identified in the Made Ground, and subsequent monitoring did not identify chemical exceedances in groundwater. Given the distance to the nearest identified surface water feature and no abstraction licenses within 500m, an unacceptable risk is not considered to be present.
	Permeation of water pipes.	Construction materials, future end users	Medium	Low likelihood	Moderate / low	A moderate to low likelihood of potential hydrocarbon permeation of pipes is considered to site based upon the results of soil and groundwater screening. The results should be supplied to the water supply company to determine the appropriate pipework for use on site.
	Gas Migration and build up within buildings.	Future end users and building structures	Severe	Unlikely	Moderate / low	Based upon the results of ground gas monitoring, a moderate to low risk is considered to site from ground gasses. Characteristic Situation CS-1 has been considered appropriate for the site based on the ground gas monitoring results.
	Plant Uptake	Flora and Fauna	Mild	Low likelihood	Low	Phytotoxic contamination as a consequence of historic and current land uses is unlikely.

11 Contamination Conclusion and Recommendations

The following recommendations are based on the results of the conceptual site model and risk assessment.

11.1 Conclusion

Based on the conceptual site model and risk assessment there is a considered moderate risk to end users, site workers and other environmental receptors.

Elevated concentrations of lead and four congeners of polycyclic aromatic hydrocarbons have been identified within soils up to 1.00mbgl in soils beneath proposed soft landscaping, parking and building footprints, which exceed the screening values for residential developments both with and without homegrown produce. Future site users and workers have the potential to come into contact with these soils.

Elevated concentrations of cadmium, nickel and zinc were identified in the first round of groundwater sampling which exceed water quality standards for surface water. No source has been identified within shallow Made Ground soils on site and the exceedances were not repeated during the second round of sampling.

The exceedances in relation to surface water quality standards concentrations are not considered to be significant given the industrial history of the surrounding area and the lack of exceedances during a subsequent round of monitoring and sampling. The closest surface water receptor is a lake in Bushy Park, located approximately 850m south of site, and given the distance to this receptor and unacceptable risk is not considered to be present

Based on the gas monitoring results and in line with classification, as detailed within C665 documentation, the CS level has been calculated as CS-1. Consequently, gas protection measures are not considered to be required to be installed within the proposed development.

11.2 Recommendations

11.2.1 Delineation / Remediation

It is considered that a pathway break will be introduced between soils and human receptors in the proposed parking and building footprint areas.

It is recommended that delineation through further sampling and testing could be considered in the proposed soft landscaping area in the south. This may reduce the area requiring remediation.

In the absence of a delineation exercise remedial works will be required in the proposed soft landscaping area in the south of site to address the risks identified. If soils are removed in this part of the site, then this could remediate the area by removing the contamination source. The recommended minimum thickness for clean capping soils is 600mm.

Excavations within the root protection zones of trees on site should have consideration for the NHBC trees standards and root protection areas associated with the existing trees on site and adjacent to site. The Local Planning Authority Tree Officer should be contacted to discuss options.

A remedial strategy must be undertaken and submitted to the Local Planning Authority prior to any of the aforementioned works being undertaken. Any remediation undertaken would then require validation to show that the identified risks have been adequately addressed.

11.2.2 Protection of Ground Workers

Suitable health and safety measures will be required for groundworkers. Appropriate precautions should be put in place following risk assessment. This should include, but not limited to, the adoption of suitable safe systems of work, provision of personal protective equipment, dust suppression, the provision and use of welfare facilities and suitable protective measures for the current site users.

11.2.3 Watching Brief

It is recommended that a watching brief be maintained on site, particularly during the groundwork stage. During any ground works a competent person should make an appraisal of the exposed soils. If any material is noted to show visual and/or olfactory signs of contamination it should be stockpiled separately and tested prior to its appropriate removal off-site or re-use. If soils suspected of being contaminated are encountered, it is recommended that a contaminated land specialist be consulted.

11.2.4 Buried Services

Potable water pipework shall comply with the Water Supply Regulations. The agreement of the water provider and Local Authority should be sought regarding the potable water pipework and fittings selected prior to commencement.

11.2.5 Importing and Re-Use of Soil and Materials Management Plan

It is not anticipated that excavated materials will be re-used on site. A material would not be considered a waste if it is uncontaminated soil and other naturally occurring material excavated in the course of construction activities, where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated.

Where the reuse of excavated material is intended, in accordance with the 'CL:AIRE Definition of Waste: Development Industry Code of Practice', a MMP should be prepared. The Environment Agency should be consulted at an early stage in this process, and this should be overseen by a 'competent person' as defined by LCRM.

11.2.6 Soil Disposal

The client and contractors are advised to follow the process outlined in the Environment Agency's Technical Guidance Document WM3 '*Waste Classification – Guidance on the Classification and Assessment of Waste*', 1st edition 2021, v1.2 GB.

Based on the soil testing results, waste soils to be removed from site should be classified as **Non-Hazardous**, categorised as 17 05 04 in the List of Waste from WM3. WAC testing was undertaken for completeness and samples failed the Inert Waste WAC limits. Therefore, as per EA guidance '*Dispose of Waste to Landfill*' (published January 2020), excavated soils to be removed off-site meet the requirements for disposal at a landfill for non-hazardous waste.

The developer has a statutory responsibility under the Duty of Care Regulations of the Environmental Protection Act 1990 to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner.

To comply with the Duty of Care all wastes taken off site, in solid or liquid form, must be handled by a registered waste carrier and be accompanied by a consignment note that describes the waste.

11.2.7 Statutory Authority Consultation

It is recommended that this report be sent to the statutory authorities including the Local Authority Environmental Health and Planning Departments prior to site works commencing to seek their comments. Where necessary, they will consult the Environment Agency or other relevant statutory authorities. If applicable to this project, this report should also be provided to the relevant building warranty provider.

12 Geotechnical Assessment

Comments regarding foundation design and construction are provided below.

12.1 Summary of Proposals and Ground Conditions

The development proposals and encountered ground conditions are summarised below.

12.1.1 Development Proposals

Development proposals are understood to include the demolition of the existing 7-storey residential block and replacement with a 31-unit, 5-storey residential block with car parking provisions and a communal garden.

12.1.2 Summary of Ground Conditions and Test Results

The encountered ground conditions and in-situ and geotechnical laboratory test results are summarised in **Table 12.1** to **Table 12.3**.

Table 12.1 Summary of Encountered Ground Conditions

Stratum	Location	Surface Depth (mbgl)	Base Depth (mbgl)	Thickness (m)
Made Ground	All positions	0.00	0.30 to 0.60	0.30 to 0.60
Kempton Park Gravel Member	All positions	0.30-0.60	≥1.30* to 7.30	≥0.70 to 6.90
London Clay Formation	CP01	7.30	≥25.00*	≥17.60
Groundwater	Groundwater seepage was noted in CP01 at 2.2mbgl during the intrusive site investigation works. No groundwater was encountered in the dynamic sampling boreholes or trial pits. During monitoring, groundwater was observed between 4.12mbgl and 4.19mbgl in borehole CP01; the dynamic sampling boreholes were dry.			

*base of stratum not proven at all borehole locations

Table 12.2 Summary of Test Results

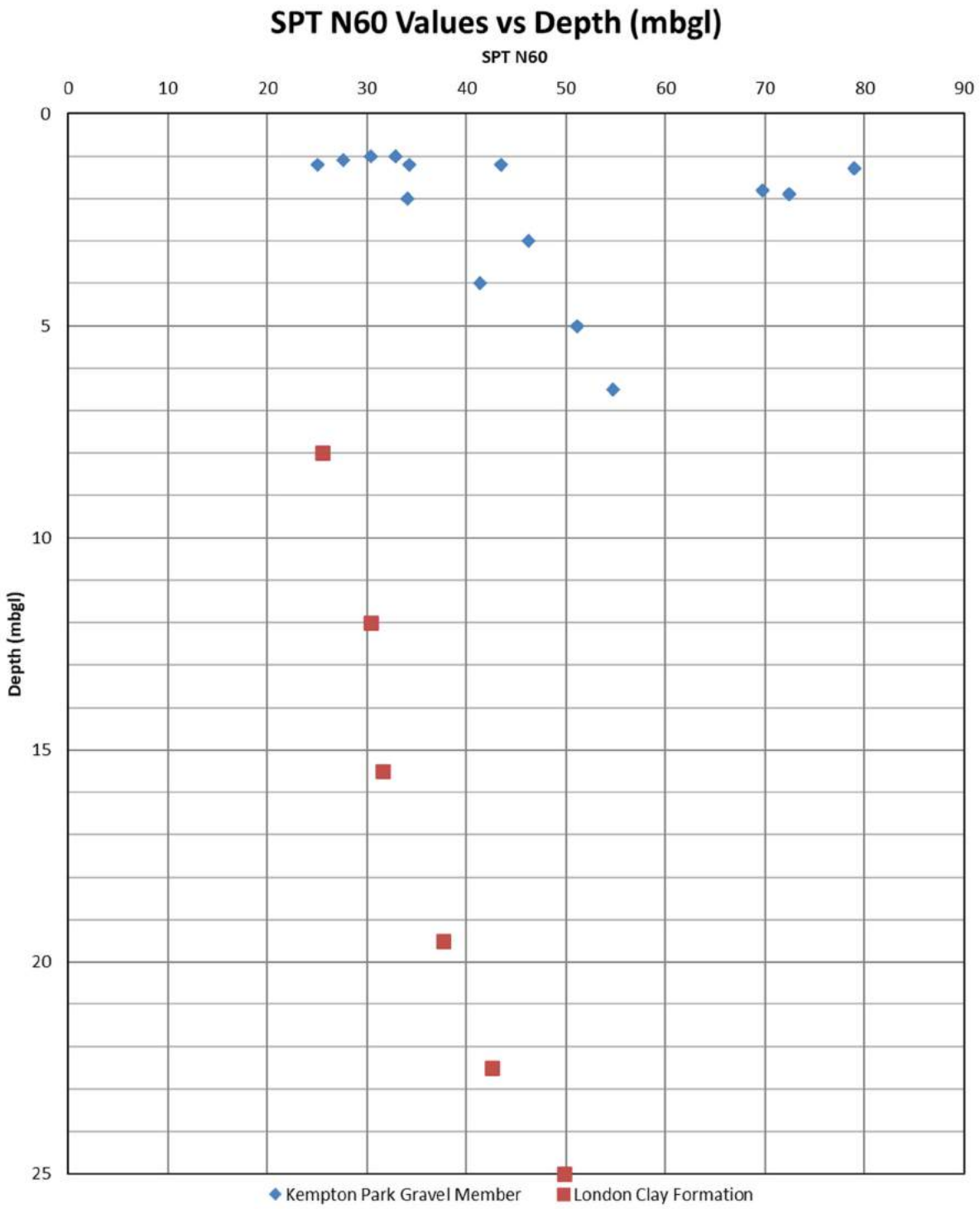
Stratum	Corrected SPT 'N60' Value	Angle of Shearing Resistance	Moisture Content (%)	Plasticity Index (%)	c_u (kPa)	
					SPT N60 x 4.2	Triaxial Test
Kempton Park Gravel Member	25 - 79	35 - 46	8 - 10	14 - 15	-	-
London Clay Formation	26 - 50	-	24 - 34	38 - 48	107 - 210	121 - 237

Table 12.3 Summary of PSD Results

Stratum	Fines (%)	Sand (%)	Gravel (%)	Cobbles (%)
Kempton Park Gravel Member	2 – 3	36 – 63	35 – 61	0

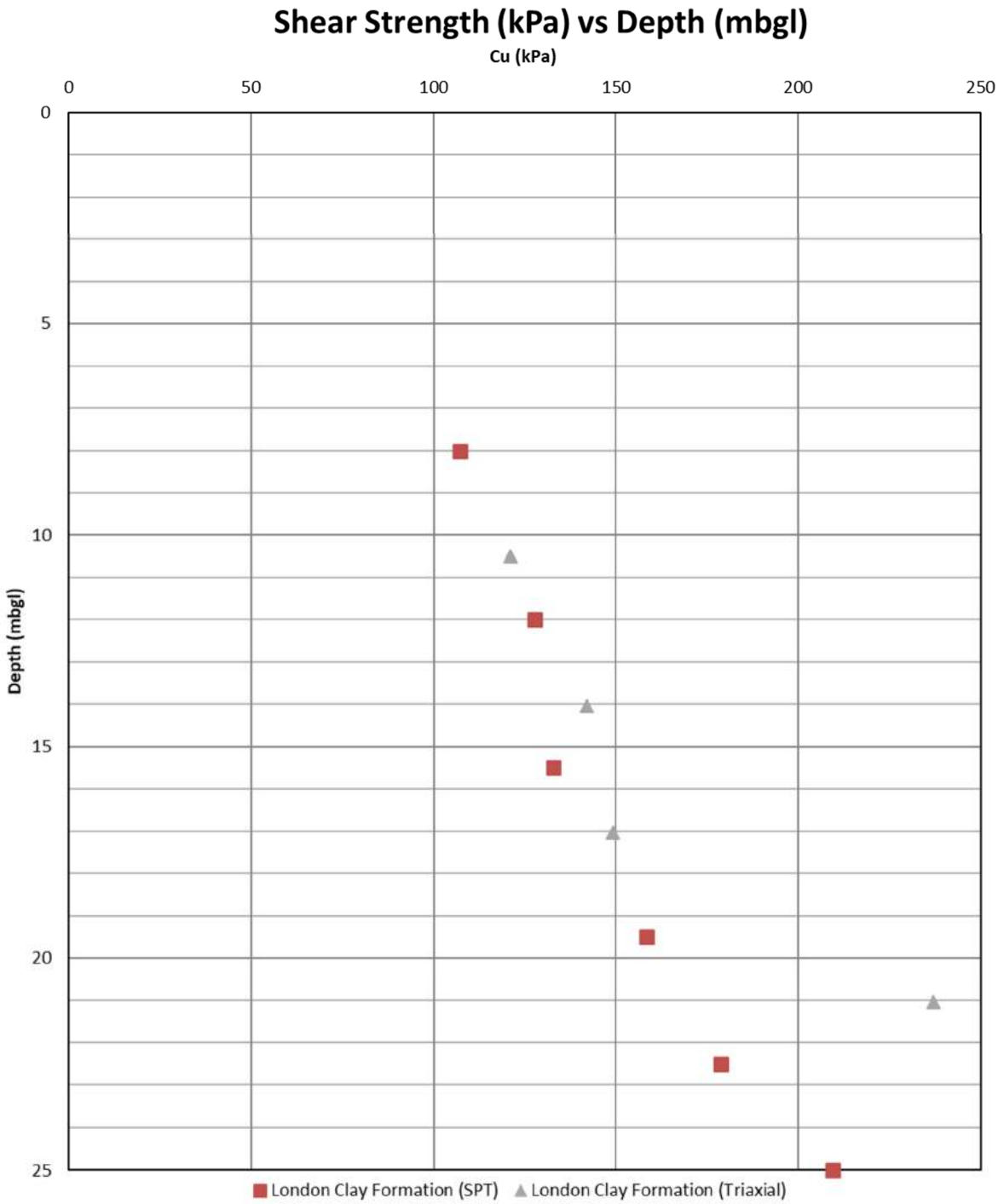
The SPT N60 values have been calculated using an energy ratio of 73% from the cable percussive drilling rig and 79% from the dynamic sampling drilling rig. The corrected results are compared to depth in **Figure 12.1** below.

Figure 12.1 SPT N60 Values vs Depth (mbgl)



The undrained shear strengths calculated from N60 values for the cohesive London Clay Formation soils and determined by laboratory and in-situ testing have been plotted against depth and are presented as **Figure 12.2**.

Figure 12.2 Cu (kPa) vs Depth (mbgl)



12.2 Foundations

The following assessment is based on the ground conditions encountered and parameters determined from the intrusive site investigation, including the results of laboratory analysis. At the time of writing detailed design information and structural loads of the proposed buildings were not available, however it is assumed that the proposed structure will form a new multi storey residential block.

It is assumed that finished ground levels will be at or close to current ground levels, if this is not the case then this assessment will need to be reviewed.

Based on the geotechnical data obtained to date, the ground conditions encountered on site are considered appropriate for traditional trench fill/pad foundations bearing on the underlying natural coarse Kempton Park Gravel Member soils. The soils encountered on site have been interpreted to represent superficial deposits of the Kempton Park Gravel Member overlying bedrock of the London Clay Formation.

Testing undertaken on the coarse soils of the Kempton Park Gravel Member indicated soils of a medium dense to very dense relative density. Testing undertaken on the fine cohesive London Clay Formation soils encountered underlying the superficial coarse soils indicated stiff to very stiff clay with a medium to high volume change potential.

A number of trees are present on site. Thin bands of low volume change potential superficial gravelly clay soils have been encountered to depths of up to 1.70m bgl at locations TP03 and WS02. Whilst the medium to high shrinkable London Clay Formation cohesive clay soils have not been encountered until 7.30mbgl at location CP01, foundations constructed within the influencing distance of trees (whether on or off site and whether to remain, be removed or planted), should have the foundations locally deepened. Rare roots were only identified to some 2m depth, Localised clay units within the Kempton Park Gravel Member were only encountered within the shallowest 2m depth with granular deposits extending to some 7m depth. On this basis it is considered that minimum foundation depths based on appropriate industry guidance, such as NHBC Standards Chapter 4.2, may be excessively conservative and foundation depths may be limited to 2m to take such foundations below any shallow clay units and below observed rare root growth. Such foundations may still require heave protection.

Any made ground or reworked soils encountered within the proposed building footprint are considered unsuitable as a founding stratum and all foundations will need to fully penetrate any made ground, low strength or otherwise unsuitable soils and below any ground affected by grubbing out of the existing foundations and services and be founded a minimum of 150mm into the natural undisturbed founding stratum. It is recommended that shallow foundations are placed within the natural coarse soils and if any areas of superficial fine cohesive soils are encountered, such as at locations TP03 and WS02, these soils are fully penetrated.

A competent person should inspect foundation excavations to ensure they comply with design assumptions. Made Ground has been encountered to a maximum depth of 0.60mbgl at locations WS01, WS02 and WS03, but could be deeper in other areas of the site; grubbing out of existing foundations and services is likely to result in deeper disturbed ground.

Based on the site investigation data and testing available, for a 1.0m wide strip/trench fill foundation, bearing on the underlying natural coarse Kempton Park Gravel Member soils at a

depth of 1.0m, a design bearing resistance of 300kN/m^2 is considered appropriate. However it is recommended that foundations are taken to 2m due to presence of clay lenses and rare rootlets.

For a 1.0m wide strip/trench fill foundation bearing on the Kempton Park Gravel Member at 2.0m depth, a design bearing resistance of 350kN/m^2 should be available.

Alternatively for a 2.0m square pad foundation bearing on the underlying natural coarse Kempton Park Gravel Member soils at a depth of 1.0m, a design bearing resistance of 285kN/m^2 should be available. However it is recommended that foundations are taken to 2m due to presence of clay lenses and rare rootlets.

For a 2.0m square pad foundation bearing on the coarse Kempton Park Gravel Member soils at a depth of 2.0m, a design bearing resistance of 325kN/m^2 should be available.

The above is only applicable for foundations with loads that are applied vertically and centrally and should result in total settlements of not more than 25mm, keeping differential settlements within acceptable limits.

In the absence of design loads the bearing capacity assessment has been undertaken for Design Approach 1, Combination 2 only, and a further assessment taking account of anticipated loadings will be required during detailed design in order to confirm the limit states are satisfied.

If the design bearing capacities noted above are considered inadequate, then consideration should be given to the use of a piled foundation solution. The choice of piling system and detailed design of piles are beyond the scope of this report and should be undertaken by a specialist piling contractor.

12.3 Stability of Excavations and Dewatering Considerations

The sides of excavations through Made Ground or granular soils would not be expected to remain stable and may require temporary support with appropriate shoring to prevent excavation collapse during construction.

Instability is more likely where excavations are left open for longer periods and during inclement weather and may require temporary support with appropriate shoring to prevent excavation collapse during construction.

Where support systems are required, this must be designed by a suitably qualified engineer. Precautionary measures should be adopted should excavations be expected to remain open for an extended period and must be installed if personnel are to enter.

Groundwater seepage was noted in CP01 at 2.2mbgl during fieldwork. It is considered that should groundwater be encountered at shallow excavation depths, it will likely be suitably controlled using sump pumps.

12.4 Floor Slabs

Shallow ground conditions on site comprise approximately 600mm of made ground overlying natural coarse soils. Grubbing out of existing foundations and services may disturb the ground to a deeper and greater extent. At this stage consideration should be given to adopting a suspended floor slab. Whilst the natural coarse soils could be considered a suitable formation for ground bearing slabs following proof rolling any Made Ground/disturbed ground would

need to be removed and replaced with selected compacted granular materials. During preparation, the formation should be inspected and any soft or unsuitable materials should be removed and replaced with a suitable compacted granular fill.

12.5 Hardstanding

Following site preparation and regrading it is considered that the subgrade will comprise made ground or natural coarse soils.

The made ground on site is likely to be variable and for preliminary design purposes is considered to have a CBR of 2%. It is recommended that once the site has been graded to the appropriate pavement formation level, it is inspected and, if necessary, in situ CBR testing be conducted on the subgrade to confirm the appropriate pavement design (i.e. to determine the subbase and capping thickness). In addition, the formation should be proof-rolled and any soft/loose pockets encountered should be excavated and replaced with well-compacted granular fill prior to pavement construction. Additional guidance is provided in BS7533-10:2010.

Plate bearing tests on the hardstanding recorded an equivalent CBR value of >26%, with a result of 10% on the block paving and results between 1% and 4% on the shallow Made Ground at a depth of 0.20mbgl.

12.6 Chemical Attack on Buried Concrete

The results of testing for aggressive ground conditions have been summarised below in **Table 12.4,** the design sulphate class (DS) and aggressive chemical environment for concrete (ACEC) has also been provided.

Table 12.4 Summary of Test Results

Stratum	**Determinand**					**DS / ACEC Class**
	Total sulphate (%)	W/S sulphate SO_4 (mg/l)	Total sulphur (%)	pH	Total Potential Sulphate	
Made Ground	0.03	< 10	< 0.02	7	-	DS-1 / AC-1
Kempton Park Gravel Member	0.03–0.06	13–227	< 0.02 – 0.02	7.7 - 8.5	-	DS-1 / AC-1
London Clay Formation	0.05 -0.06	108-150	0.28 – 0.65	6.8 – 8.9	0.84-1.95	DS-4 / AC-4
Groundwater	-	103-105	-	7.3	-	DS-1 / AC-1

The London Clay Formation has been designated a design sulphate class of DS-4/AC-4 based on the Total Potential Sulphate values calculated. However, it is recognised that given the depth of the London Clay on site oxidation is unlikely and concrete placed within this strata is therefore also unlikely to be exposed to ground that has been disturbed. A lower design sulphate class could therefore be considered if for example piled foundations were to be placed into the London Clay.

13 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by agb Environmental Ltd.

Should any changes to the development be proposed, including changes to the proposed landscaping, then the risks will need to be reassessed. This may require additional site investigation work and may result in the need for alteration of the remedial works.

Advice provided within this report is based on current guidelines available at the time of writing. This report is subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency and Local Authority and the NHBC.

It is possible the conditions observed during the site investigation may change. This may result in changes to sources, pathways or receptors that were unforeseen and unexpected. Statements relating to ground gas or groundwater conditions are based on observations made at the time of the site investigation (unless otherwise stated). Ground gas or groundwater conditions may vary as a result of seasonal fluctuations or other effects.

Ground contamination can exist as small discrete areas of contamination and there can be no certainty that any or all such areas have been sampled or identified. This is particularly significant for an investigation by exploratory holes (as used in this site investigation) as a relatively small sample of soil is extracted, which may not be entirely representative of the surrounding ground conditions.

The geotechnical advice given in this report seeks to provide foundation design guidelines for the proposed building(s). The recommendations/advice given is based on the available information obtained during the investigation. Should any unusual ground conditions be encountered that differ from those proved in the exploratory holes further advice should be sought from agb Environmental Ltd.

This report is written in the context of an agreed scope of work between agb Environmental Ltd and the Client and should only be used in this specific context. Re-interpretation of the Site Investigation and/or this report in whole or part may become necessary if additional information becomes available or practices or legislation changes. agb Environmental Ltd does not provide legal advice; the advice of the Client's legal advisors may also be required. agb Environmental Ltd Terms and Conditions apply.

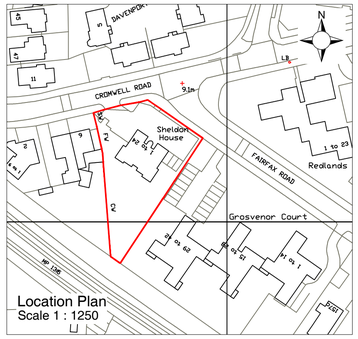
Appendix 1 Plans

DRAWING 2 - ELEVATIONS AS EXISTING

PRINT AT A1 PAPER SIZE

0 2m 4m 6m 8m 10m

SCALE BAR AT 1:200



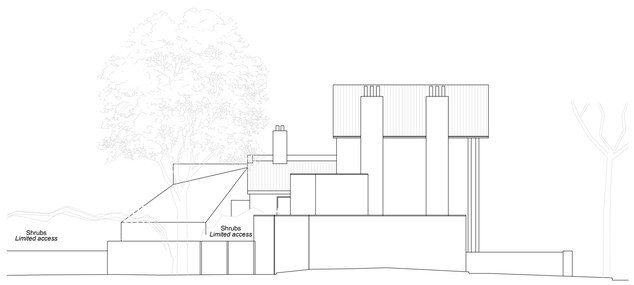
Sheldon House
Front Elevation

Sheldon House
Rear Elevation

Sheldon House
North-West Side Elevation

Sheldon House
South-East Side Elevation

n.2/4/6 Cromwell Road
Front Elevation



n.6 Cromwell Road
Side Elevation

Grosvenor Court
Front Elevation

Magnolia Square
We Know London. We Draw London.
Magnolia Square Limited
57 Rathbone Place
Soho
London
W1T 1JU
020 7479 4855

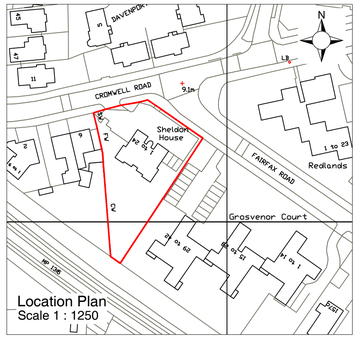
Client: Clive Chapman Architects	Job Title: Existing Information	Notes: All works to be carried out in accordance with current building regulations. All dimensions / levels to be checked and verified on site before commencing any work and any discrepancies to be reported to the office immediately. This drawing to be read in conjunction with contract documents, project working drawings, specification, all consultants / specialists drawings, details and specification.	Scale: 1:200@A1 · Drawn: MZ
Drawing Title: Elevations	Site Address: Sheldon House Cromwell Road, Teddington TW11 9EJ		Date: March 2021 · Job No: 21100
			Drawing No: 2 · Rev:

DRAWING 1 - SITE PLAN AS EXISTING

PRINT AT A1 PAPER SIZE

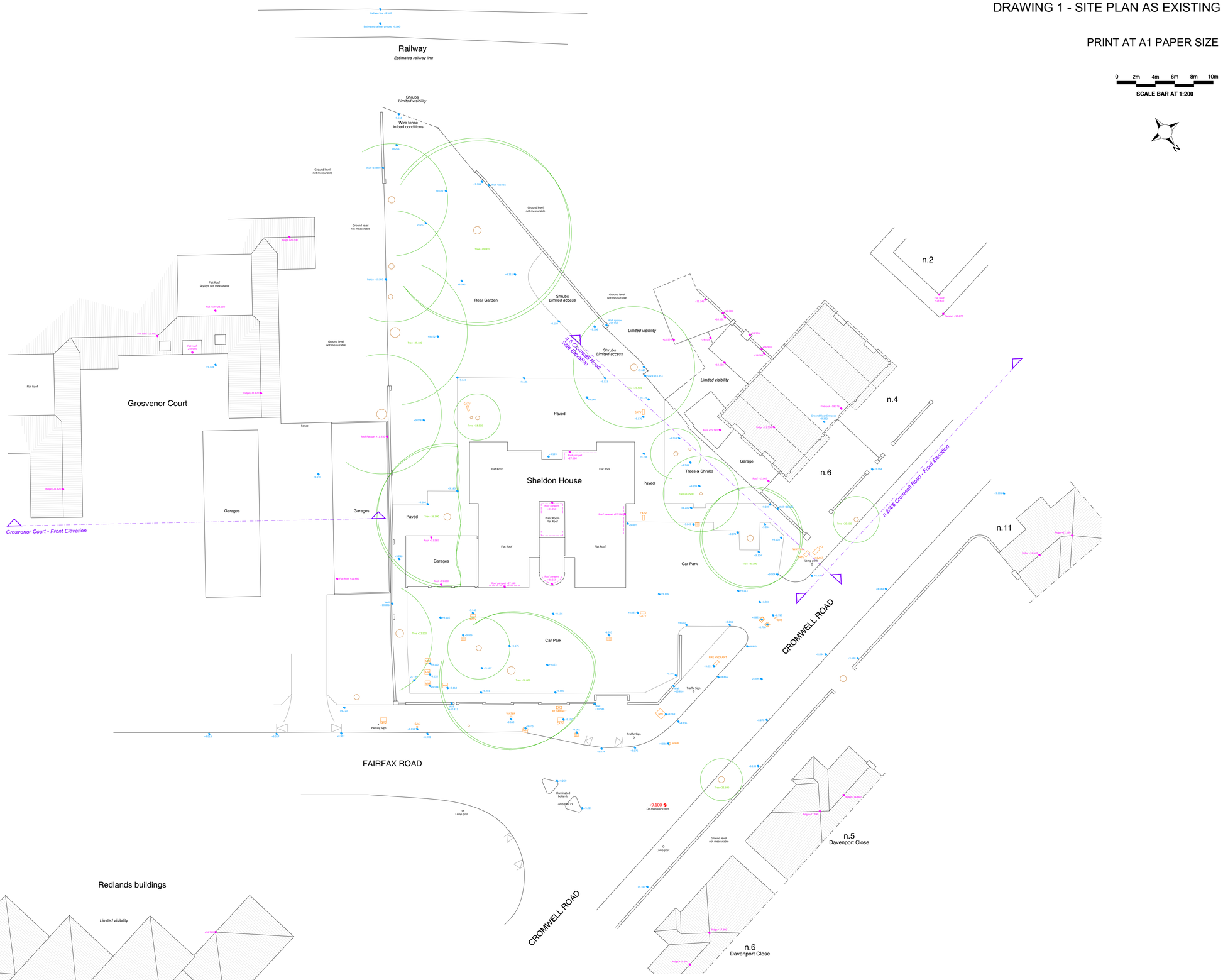
0 2m 4m 6m 8m 10m

SCALE BAR AT 1:200



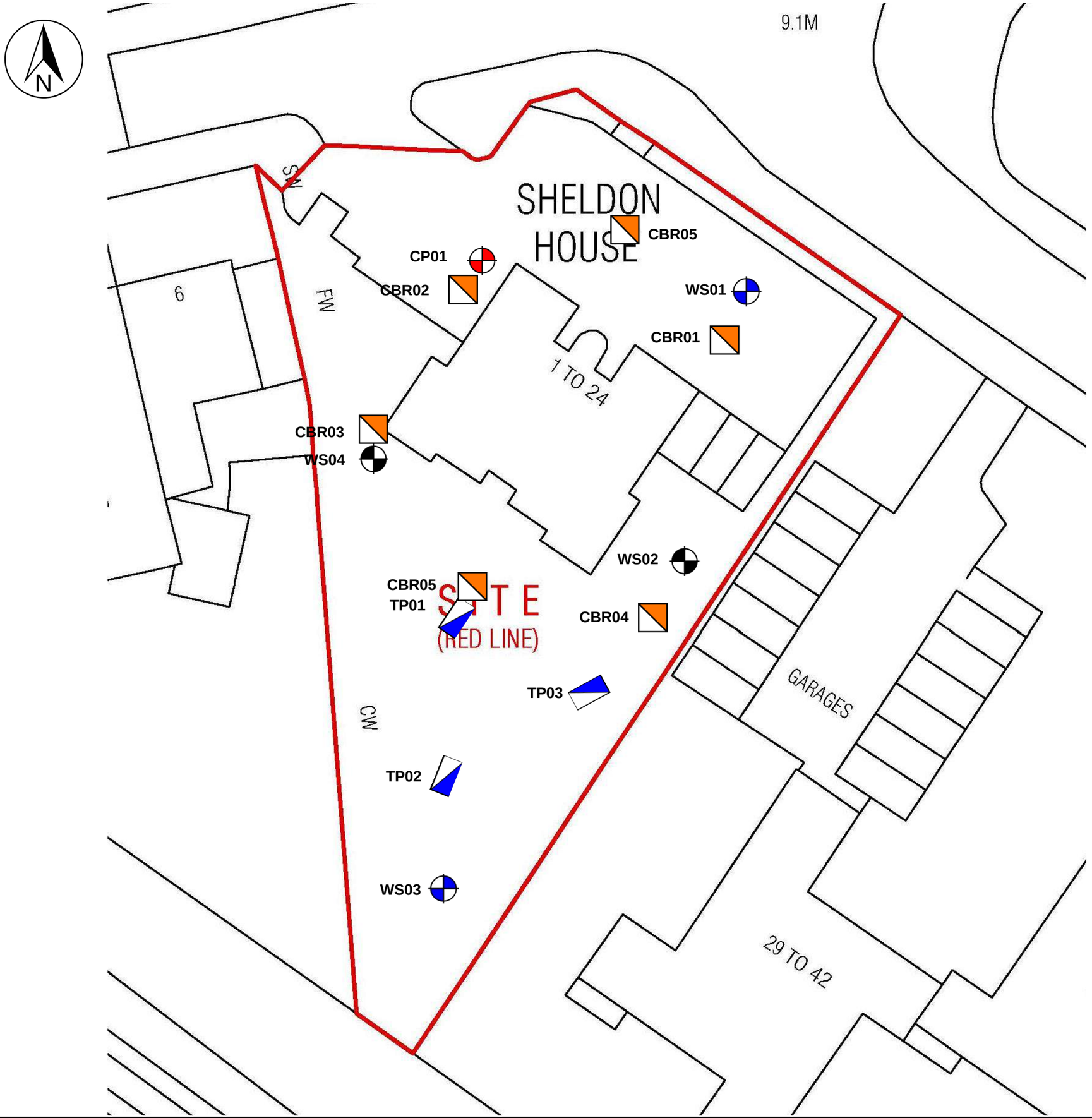
KEY

- MH — Manhole
- Drain
- +9.093 — Ground level
- +11.580 — Roof level
- +20.800 — Tree height



Magnolia Square Limited 57 Rathbone Place Soho London W1T 1JU 020 7479 4855	Client: Clive Chapman Architects	Job Title: Existing Information	Notes: All works to be carried out in accordance with current building regulations. All dimensions / levels to be checked and verified on site before commencing any work and any discrepancies to be reported to the office immediately. This drawing to be read in conjunction with contract documents, project working drawings, specification, all consultants / specialists drawings, details and specification.	Scale: 1:200@A1	Drawn: MZ
	Drawing Title: Site Plan	Site Address: Sheldon House Cromwell Road, Teddington TW11 9EJ		Date: March 2021	Job No: 21100
				Drawing No: 1	Rev:

Appendix 2 Fieldwork Records



Legend

- WS borehole location
- WS borehole location with monitoring well installation
- CP borehole location with monitoring well installation
- Trial Pit Locations
- Plate Load Testing Locations

Project

Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Title

Exploratory Hole Location Plan

Client

RHP

agb Environmental Ltd
1, The Mill, Copley Hill Business Park,
Babraham Road, Cambridge, CB22 3GN
Tel: 01223 776117
Email: Info@agbenvironmental.co.uk
Web: www.agbenvironmental.co.uk

Date 30th June 2022

Scale NTS

Project number . Drawing number

P4301.3.002

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				CP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	30-06-22 05-07-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 5

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						0.20	Concrete with 7mm diameter rebar at 0.10m.		
0.30	D					0.40	MADE GROUND: Brown gravelly SAND. Gravel is brick, concrete and chert gravel.		
0.30	ES								
0.50	D					(0.40)	Dark grey fine SAND. (KEMPTON PARK GRAVEL MEMBER)		
0.50	ES					0.80			
1.00		N25					Medium dense brown fine SAND. (KEMPTON PARK GRAVEL MEMBER)		
1.20	D					(0.80)			
1.20	ES								
						1.60			
1.80	D						Medium dense to dense brown cobbly gravelly fine SAND. Cobbles and gravel are rounded chert. (KEMPTON PARK GRAVEL MEMBER)		
1.80	ES								
2.00	B								
2.00		N28							
						(2.10)			
3.00	ES								
3.00		N38							
						3.70			
4.00	B						Dense orange medium SAND with gravel and cobbles of subrounded to rounded chert. (KEMPTON PARK GRAVEL MEMBER)		
4.00		N34							
5.00	ES								
5.00		N42							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Groundwater seepage at 2.2m. No significant roots. *No recovery in U sample at 9.5m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Cable percussive rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				CP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	30-06-22 05-07-22			
Contractor				Sheet
Agb Environmental Ltd				2 of 5

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(3.60)	Dense orange medium SAND with gravel and cobbles of subrounded to rounded chert. (KEMPTON PARK GRAVEL MEMBER) *(continued)*		
6.50		N45							
7.00	B								
7.00	ES					7.30			
7.30	B						Firm to stiff grey CLAY. (LONDON CLAY FORMATION)		
8.00	D								
8.00		N21				(2.20)			
9.00	D								
						9.50			
9.50	U*						CLAYSTONE. (LONDON CLAY FORMATION)		
						(0.90)			
						10.40			
10.50	U						Stiff to very stiff grey CLAY with occasional patches of claystone.(LONDON CLAY FORMATION)		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Groundwater seepage at 2.2m. No significant roots. *No recovery in U sample at 9.5m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Cable percussive rig	Logged By HG

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				CP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	30-06-22 05-07-22			
Contractor				Sheet
Agb Environmental Ltd				3 of 5

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument/ Backfill
11.00	D						Stiff to very stiff grey CLAY with occasional patches of claystone.(LONDON CLAY FORMATION) *(continued)*		
12.00	ES								
12.00		N25							
13.00	D								
14.00	U								
14.50	D								
15.00	D								
15.00	ES								
15.50		N26							

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To

GENERAL REMARKS

Groundwater seepage at 2.2m. No significant roots.
*No recovery in U sample at 9.5m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Cable percussive rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				CP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	30-06-22 05-07-22			
Contractor				Sheet
Agb Environmental Ltd				4 of 5

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument/ Backfill
							Stiff to very stiff grey CLAY with occasional patches of claystone.(LONDON CLAY FORMATION) *(continued)*		
17.00	U					(14.60)			
18.00	D								
18.00	ES								
19.50		N31							
21.00	D								
21.00	ES								
21.00	U								

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To

GENERAL REMARKS

Groundwater seepage at 2.2m. No significant roots.
*No recovery in U sample at 9.5m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Cable percussive rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				CP01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	30-06-22 05-07-22			
Contractor				Sheet
Agb Environmental Ltd				5 of 5

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
							Stiff to very stiff grey CLAY with occasional patches of claystone.(LONDON CLAY FORMATION) *(continued)*		
22.50		N35							
24.00	D								
24.00	ES								
24.00	U								
						25.00			
25.00		N41							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater seepage at 2.2m. No significant roots. *No recovery in U sample at 9.5m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Cable percussive rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**TP01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	29-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	DS					(0.40)	MADE GROUND: brownish grey gravelly sandy SILT. Gravel is brick, chert and concrete. Occasional concrete cobbles.		
0.20	ES					0.40			
0.80	DS					(0.90)	Brown slightly silty SAND. Sand is fine. Rare subrounded to rounded chert gravel. Occasional pockets of silt. (KEMPTON PARK GRAVEL MEMBER)		
0.80	ES					1.30			
1.40	DS					1.50	Brown slightly silty gravelly SAND. Sand is fine. Gravel is subrounded chert. (KEMPTON PARK GRAVEL MEMBER)		
1.40	ES								
1.70	DS					(0.40)	Brown slightly silty SAND and GRAVEL. Sand is fine to medium. Gravel is medium to coarse subangular to subrounded chert. (KEMPTON PARK GRAVEL MEMBER)		
						1.90			
2.00	DS					(0.60)	Yellowish brown to brown slightly silty gravelly SAND. Sand is fine to medium. Gravel is subangular to subrounded chert. Silt is concentrated into lenses. (KEMPTON PARK GRAVEL MEMBER)		
2.00	ES					2.50			
2.60	DS					(0.50)	Brown very gravelly SAND. Gravel is subangular to rounded chert. Sand is fine to medium. Occasional chert cobbles. (KEMPTON PARK GRAVEL MEMBER)		
2.60	ES								
2.90	DS					3.00			
2.90	ES								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater not encountered. Rare roots to 1.5m. Dry soil noted.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Excavator	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				TP02
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	29-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	DS					(0.30) 0.30	MADE GROUND: dark brown silty SAND.		
0.20	ES								
						(0.30) 0.60	Brown slightly silty SAND. Sand is fine. Occasional chert gravel.(KEMPTON PARK GRAVEL MEMBER)		
0.80	DS						Brown slightly gravelly slightly silty SAND. Gravel is subangular to rounded chert. (KEMPTON PARK GRAVEL MEMBER)		
0.80	ES					(0.60) 1.20			
1.20	DS						Brown gravelly SAND. Sand is fine. Gravel is subangular to subrounded chert. (KEMPTON PARK GRAVEL MEMBER)		
1.20	ES					(0.60) 1.80			
						2.00	Yellowish brown gravelly SAND. Sand is medium. Gravel is subangular to rounded chert. Occasional chert cobbles. (KEMPTON PARK GRAVEL MEMBER)		
2.00	DS						Yellowish brown slightly clayey gravelly SAND. Sand is medium to coarse. Gravel is subangular to rounded chert. (KEMPTON PARK GRAVEL MEMBER)		
2.00	ES					(0.70) 2.70			
2.60	DS						Yellowish brown clayey gravelly SAND. Sand is medium to coarse. Gravel is subangular to rounded chert. (KEMPTON PARK GRAVEL MEMBER)		
2.60	ES					(0.40) 3.10			
2.90	DS								
2.90	ES								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater not encountered. Rare roots to 2.0m. Dry soil noted.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Excavator	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**TP03**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	29-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.20	DS					(0.30) 0.30	MADE GROUND: dark brown slightly gravelly sandy SILT. Occasional concrete cobbles. Sand is fine. Gravel is concrete and chert with occasional glass and brick.		
0.20	ES					(0.70) 1.00	Brown SAND with minor silt lenses. Sand is fine. (KEMPTON PARK GRAVEL MEMBER)		
0.80	DS								
0.80	ES					(0.40) 1.40	Very stiff yellowish brown sandy silty CLAY. Sand is fine. Rare gravel is medium to coarse subangular to subrounded chert. (KEMPTON PARK GRAVEL MEMBER)		
1.30	DS								
1.30	ES					(0.60) 2.00	Brown gravelly to very gravelly SAND. Sand is fine to medium. Gravel is medium to coarse chert. (KEMPTON PARK GRAVEL MEMBER)		
1.90	DS								
1.90	ES					(0.50) 2.50	Yellowish brown gravelly SAND. Sand is fine. Gravel is medium to coarse chert. (KEMPTON PARK GRAVEL MEMBER)		
2.30	DS								
2.60	DS					(0.50) 3.00	Brown very gravelly SAND. Sand is fine to medium. Gravel is medium to coarse chert. Occasional lenses of firm grey and brown mottled slightly sandy gravelly CLAY; sand is fine; gravel is chert.(KEMPTON PARK GRAVEL MEMBER)		
2.60	ES								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Groundwater not encountered. Rare roots to 2.0m. Dry soil noted.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Excavator	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**WS01**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	28-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			STRATA						
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument/ Backfill
						0.10	Concrete with 7mm diameter rebar at 0.10m.		
						0.20	Concrete with plastic sheet at 0.20m.		
0.30	DS1					0.35	MADE GROUND: brick and concrete rubble.		
0.30	ES1					0.50	MADE GROUND: dense dark grey gravelly SAND. Gravel is brick		
0.50	DS2					0.60	and chert with pockets of reworked brown sandy silt.		
0.50	ES2						MADE GROUND: dense brown gravelly SAND. Gravel is brick, chert and rare clinker. Sand is fine.		
						(0.60)	Brown silty SAND. Sand is fine. Rare chert gravel.(KEMPTON PARK GRAVEL MEMBER)		
1.00	DS3								
1.00	ES3					1.20			
1.20		N26				(0.30)	Dense brown silty SAND. Sand is fine. Occasional chert gravel.(KEMPTON PARK GRAVEL MEMBER)		
						1.50			
1.60	DS4					(0.30)	Very dense yellowish brown very gravelly SAND. Sand is fine. Gravel is subrounded chert. (KEMPTON PARK GRAVEL MEMBER)		
1.60	ES4					1.80			
1.80		N53							

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To

GENERAL REMARKS

Groundwater not encountered. Rare roots to 1.8m. Refusal at 1.8m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Dynamic sampling rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**WS02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	28-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(0.30)	MADE GROUND: dark brown slightly gravelly slightly silty SAND. Sand is fine. Gravel is medium subangular to subrounded chert with occasional fine clinker and medium white porcelain. Rare chert cobbles.		
0.20	DS1					0.30			
0.20	ES1					(0.30)	MADE GROUND: brownish grey slightly silty gravelly SAND. Sand is fine. Gravel is chert and concrete with occasional brick and clinker.		
0.50	DS2					0.60			
0.50	ES2					0.80	Dark yellowish brown fine SAND. (KEMPTON PARK GRAVEL MEMBER)		
1.00	DS3					(0.50)	Yellowish brown slightly silty SAND. Sand is fine. (KEMPTON PARK GRAVEL MEMBER)		
1.00	ES3								
1.20		N19				1.30	Stiff orangish brown to yellowish brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular and subangular chert. Occasional subhorizontal dark brown staining. (KEMPTON PARK GRAVEL MEMBER)		
1.40	DS4					(0.40)			
1.40	ES4					1.70	Brown gravelly slightly silty SAND. Sand is fine to medium. Gravel is chert. (KEMPTON PARK GRAVEL MEMBER)		
1.80	DS5					1.90			
1.80	ES5					2.00	Very dense brown sandy GRAVEL. Gravel is chert, recovered fractured. Sand is fine to medium. (KEMPTON PARK GRAVEL MEMBER)		
2.00		N52							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Groundwater not encountered. Rare roots to 1.9m. Refusal at 2.0m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Dynamic sampling rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**WS03**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	28-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.30	DS1					(0.60)	MADE GROUND: dark brown slightly gravelly slightly sandy SILT. Gravel is glass fragments, glass bottles, porcelain fragments, metal wire and lumps, red brick and red chert. Occaisonal concrete cobbles.		
0.30	ES1					0.60			
0.80	DS2					(0.60)	Medium dense yellowish brown sandy SILT. Sand is fine. (KEMPTON PARK GRAVEL MEMBER, POSSIBLY REWORKED)		
0.80	ES2					1.20			
1.20	DS3					1.30	Very dense yellowish brown SAND and GRAVEL. Sand is fine. Gravel is chert, recovered fragmented. (KEMPTON PARK GRAVEL MEMBER)		
1.20	ES3								
1.20		N33							
1.30		N60							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	Groundwater not encountered. No significant roots. Refusal at 1.3m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Dynamic sampling rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

agb Environmental

BOREHOLE LOG

Project				BOREHOLE No
Sheldon House, Cromwell Road, Teddington, TW11 9EJ				**WS04**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
P4301	28-06-22			
Contractor				Sheet
Agb Environmental Ltd				1 of 1

SAMPLES & TESTS			Water	STRATA					
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument/ Backfill
						0.06	Concrete paving slab.		
						0.20	Weak concrete.		
0.25	DS1					0.30	MADE GROUND: hardcore SAND and GRAVEL. Gravel is chert and Type 1 limestone.		
0.25	ES1								
0.50	DS2						Brown very silty SAND. Sand is fine. (KEMPTON PARK GRAVEL MEMBER)		
0.50	ES2					(0.75)			
						1.05			
1.00	DS3						Medium dense off-white and cream slightly gravelly to gravelly SAND. Sand is fine. Gravel is chert, recovered fractured. (KEMPTON PARK GRAVEL MEMBER)		
1.00	ES3					1.30			
1.10		N21					Very dense yellowish brown gravelly SAND, becoming very gravelly at 1.5m. Sand is fine. Gravel is chert, recovered fractured.(KEMPTON PARK GRAVEL MEMBER)		
1.20	DS4								
1.20	ES4					(0.60)			
						1.90			
1.80	DS5								
1.80	ES5								
1.90		N55							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater not encountered. No significant roots. Refusal at 1.9m.

All dimensions in metres Scale 1:34.375	Client Richmond Housing Partnership	Method/ Plant Used Dynamic sampling rig	Logged By HG

AGS3 UK BH P4301 SHELDON HOUSE.V2.GPJ AGB1.GDT 25/7/22

Hixtra Ltd
Unit 103, Caxton Court
Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-1
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

Test Location: CBR 01
Date of Test: 29/06/2022
Description: Concrete
Reaction Load: 8 Tonne JCB
Material Class: Pile Mat
Weather: Wet
Layer: Ground Level
Plate Diameter (mm): 452
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

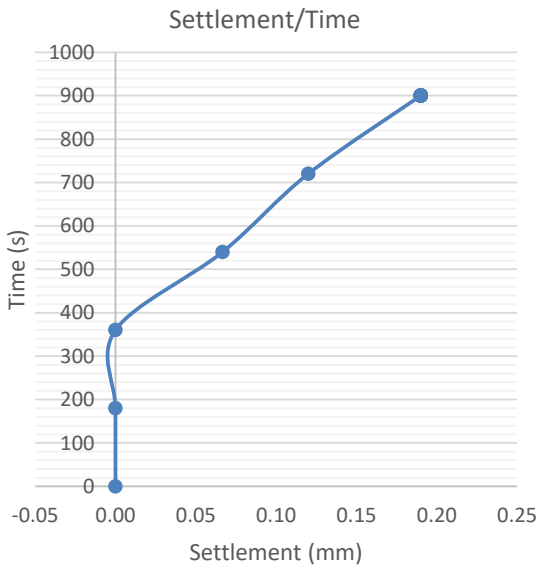
Test Results

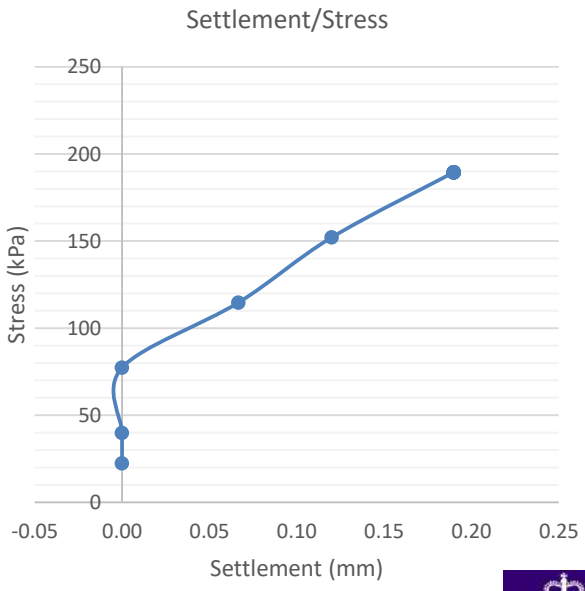
Deviation: Settlement of ≥1.25mm was not achieved so reported CBR is calculated at the maximum plate stress

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	22
180	0.00	40
360	0.00	77
540	0.07	115
720	0.12	152
900	0.19	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	0.19
Equivalent CBR Value (%):	>26
Modulus of Subgrade Reaction, k_{762} (MN/m²/m):	95

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

Kevin Shorthouse
Authorised signatory

UKAS TESTING 8996

Hixtra Ltd
Unit 103, Caxton Court
Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-2
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

Test Location: CBR 02
Date of Test: 29/06/2022
Description: Concrete
Reaction Load: 8 Tonne JCB
Material Class: Pile Mat
Weather: Wet
Layer: Ground Level
Plate Diameter (mm): 452
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

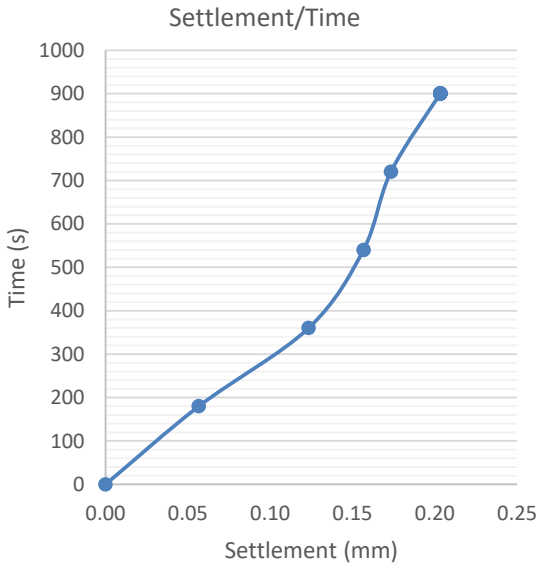
Test Results

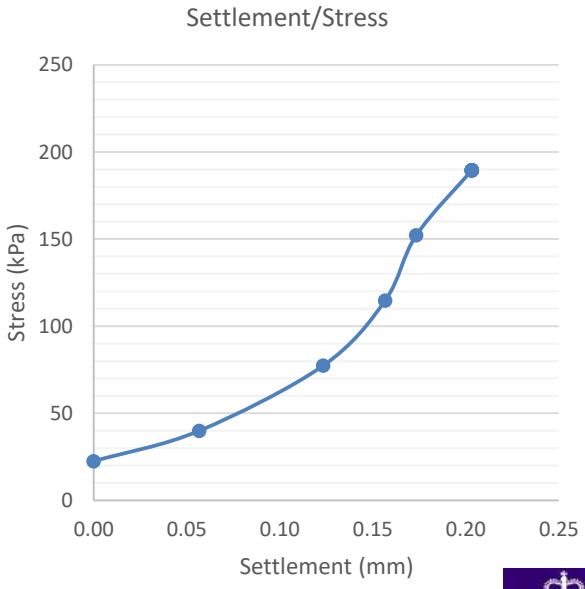
Deviation: Settlement of ≥1.25mm was not achieved so reported CBR is calculated at the maximum plate stress

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	22
180	0.06	40
360	0.12	77
540	0.16	115
720	0.17	152
900	0.20	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	0.20
Equivalent CBR Value (%):	>26
Modulus of Subgrade Reaction, k_{762} ($MN/m^2/m$):	95

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

Kevin Shorthouse
Authorised signatory

UKAS TESTING 8996

Hixtra Ltd
Unit 103, Caxton Court
Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-3
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

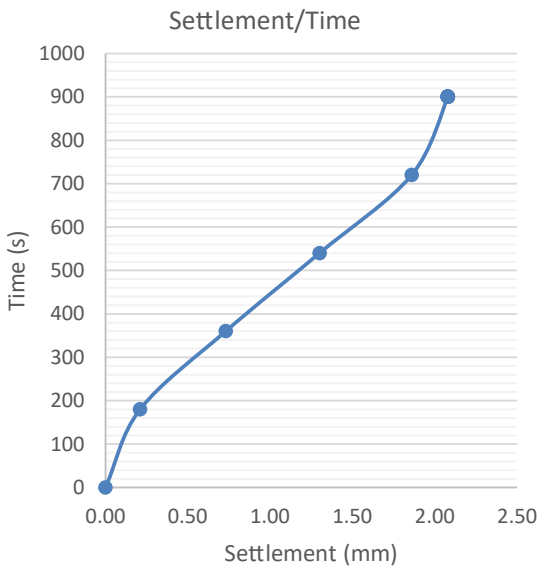
Test Location: CBR 03
Date of Test: 29/06/2022
Description: Block Paving
Reaction Load: 8 Tonne JCB
Material Class: Pile Mat
Weather: Wet
Layer: Ground Level
Plate Diameter (mm): 452
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

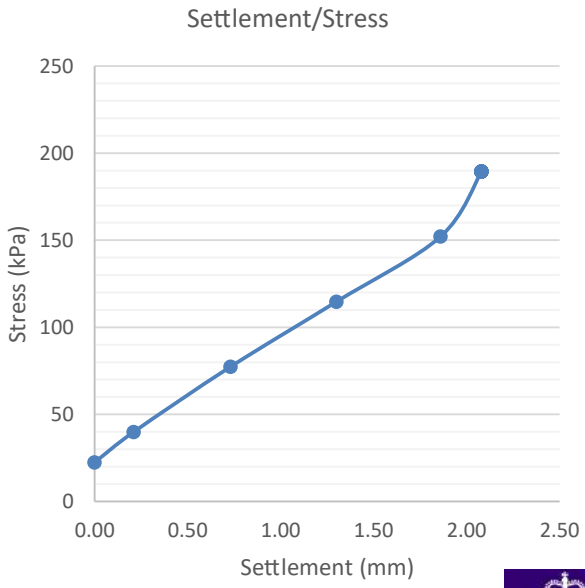
Test Results

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	22
180	0.21	40
360	0.73	77
540	1.30	115
720	1.86	152
900	2.08	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	2.08
Equivalent CBR Value (%):	10
Modulus of Subgrade Reaction, k_{762} (MN/m²/m):	56

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

Kevin Shorthouse
Authorised signatory

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Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-4
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

Test Location: CBR 04
Description: Top Soil
Material Class: Pile Mat
Layer: 0.2m BGL
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

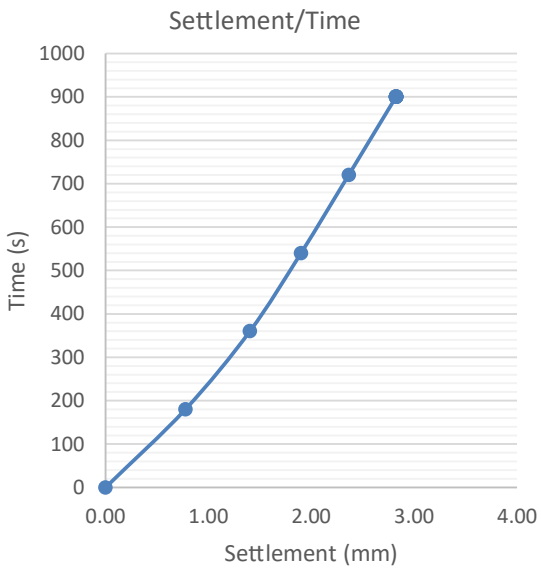
Date of Test: 29/06/2022
Reaction Load: 8 Tonne JCB
Weather: Wet
Plate Diameter (mm): 452

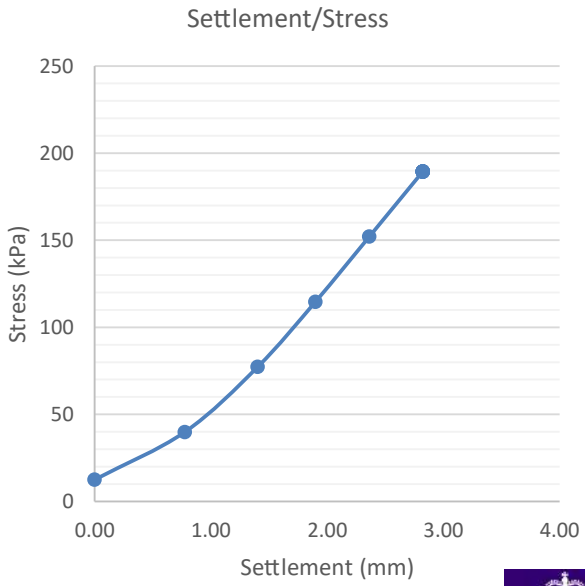
Test Results

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	12
180	0.78	40
360	1.40	77
540	1.90	115
720	2.36	152
900	2.82	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	2.82
Equivalent CBR Value (%):	4
Modulus of Subgrade Reaction, k_{762} (MN/m²/m):	34

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

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Unit 103, Caxton Court
Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-5
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

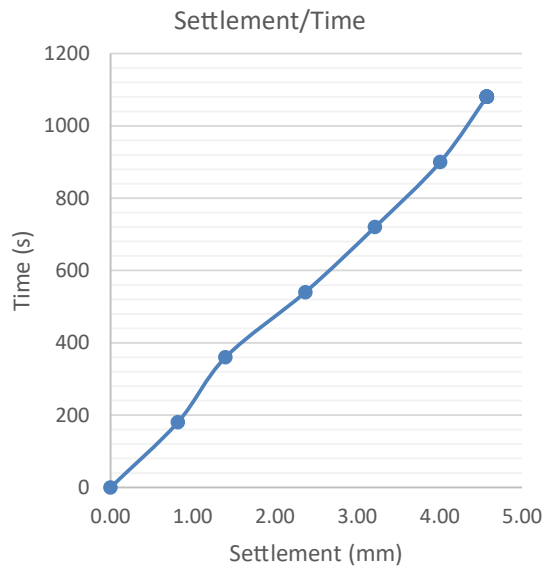
Test Location: CBR 05
Date of Test: 29/06/2022
Description: Top Soil
Reaction Load: 8 Tonne JCB
Material Class: Pile Mat
Weather: Wet
Layer: 0.2m BGL
Plate Diameter (mm): 452
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

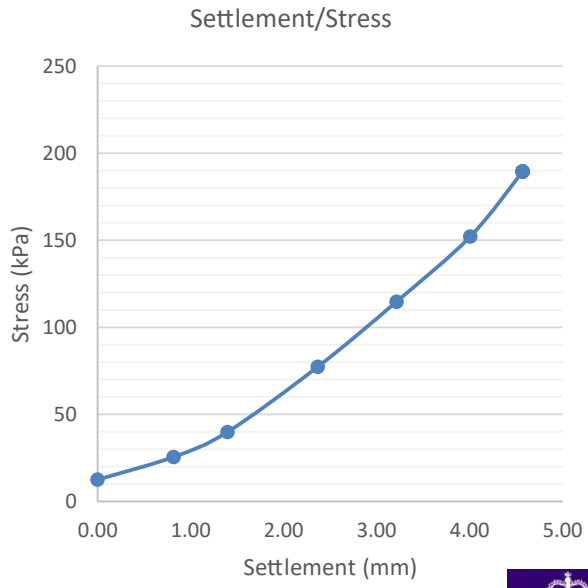
Test Results

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	12
180	0.82	26
360	1.40	40
540	2.37	77
720	3.21	115
900	4.01	152
1080	4.57	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	4.57
Equivalent CBR Value (%):	1
Modulus of Subgrade Reaction, k_{762} (MN/m²/m):	18

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

Kevin Shorthouse
Authorised signatory

UKAS TESTING 8996

Hixtra Ltd
Unit 103, Caxton Court
Garamonde Drive
Milton Keynes
MK8 8DD

Certificate for the Determination of the Vertical Deformation and Strength Characteristics of Soil by the Incremental Plate Loading Test to BS 1377 Part 9: 1990

Report No: 8152-5
Report Date: 29/06/2022
Client: AGB Environment Ltd
Address: Copley Hill Business Park
Babraham Road
Cambridge
CB22 3GN
Site: Sheldon House, Cromwell Rd, Teddington, TW11 9EJ

Test Details

Test Location: CBR 06
Date of Test: 29/06/2022
Description: Concrete
Reaction Load: 8 Tonne JCB
Material Class: Pile Mat
Weather: Wet
Layer: 0.2m BGL
Plate Diameter (mm): 452
Condition: The results apply only to the location tested and the material was tested in an 'as found' condition

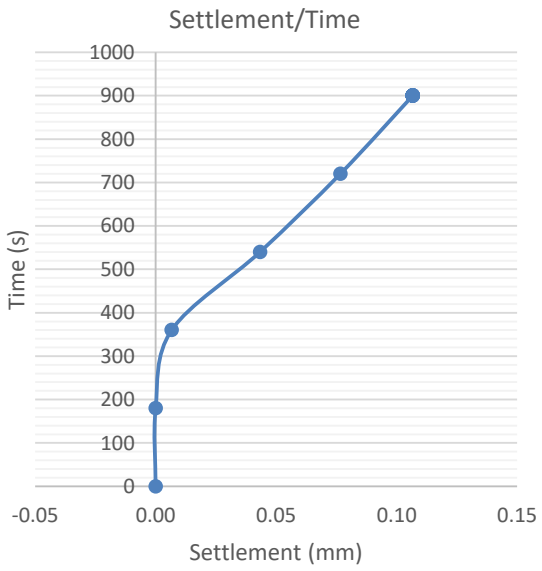
Test Results

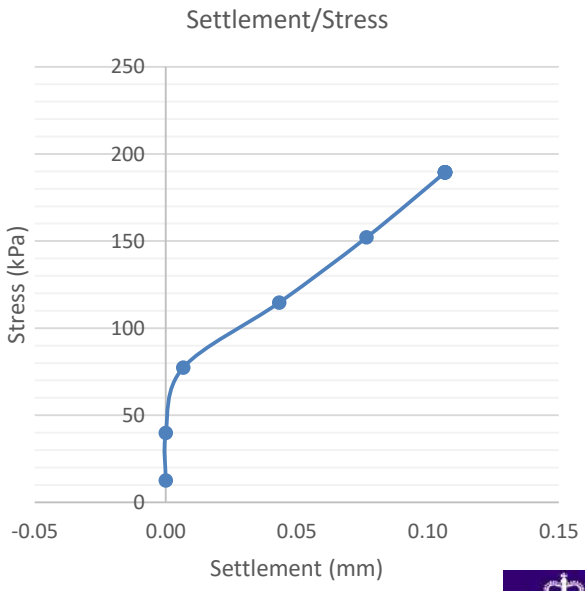
Deviation: Settlement of ≥1.25mm was not achieved so reported CBR is calculated at the maximum plate stress

Time, s	Settlement, mm	Plate Stress, kPa
0	0.00	12
180	0.00	40
360	0.01	77
540	0.04	115
720	0.08	152
900	0.11	189

Maximum Applied Stress (kPa):	189
Maximum Settlement (mm):	0.11
Equivalent CBR Value (%):	>26
Modulus of Subgrade Reaction, k_{762} (MN/m^2/m):	95

Note: Supplemental test method, calculation of Nominal CBR Value and Modulus of Subgrade Reaction: IAN 73/06 revision 1 (2009), HD 25/94 (withdrawn)





For and on behalf of Hixtra Ltd

Kevin Shorthouse
Authorised signatory

UKAS TESTING 8996

Appendix 3 Monitoring Results

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	CP01
Date:	11/07/2022
Engineer:	HG
Weather / temp:	Air pressure high and falling. 28 C, sunny.

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	2.9	0.0	16.3	4	3	1022	
+30s	2.9	0.0	13.3	4	3	1022	
+1m	2.9	0.0	13.2	4	4	1022	
+1m 30s	3.0	0.0	13.2	4	3	1022	
+2m	3.0	0.0	13.2	4	4	1022	
+2m 30s	3.1	0.0	13.2	4	4	1022	
+3m	3.1	0.0	13.2	3	4	1022	
+3m 30s	3.2	0.0	13.2	3	4	1022	
+4m	3.3	0.0	13.3	3	4	1022	
+4m 30s	3.3	0.0	13.3	3	3	1022	
+5m	3.4	0.0	13.3	3	3	1022	
Min	*2.9*	*0.0*	*13.2*	*3*	*3*	-	
Max	*3.4*	*0.0*	*16.3*	*4*	*4*	-	

Groundwater

Water Depth (m)	4.13
Well Depth (m)	10.13
Sample:	CP01, MON1, 4.15m
Comment:	-

agb Environmental Ltd

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	WS02
Date:	11/07/2022
Engineer:	HG
Weather / temp:	Air pressure high and falling. 27 C, sunny.

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	2.2	0.0	19.6	2	1	1023	
+30s	2.1	0.0	18.9	1	1	1023	
+1m	2.1	0.0	19.0	1	2	1023	
+1m 30s	1.9	0.0	19.1	1	1	1023	
+2m	1.8	0.0	19.2	1	2	1023	
+2m 30s	1.7	0.0	19.3	1	2	1023	
+3m	1.6	0.0	19.3	1	2	1023	
+3m 30s	1.5	0.0	19.4	1	2	1023	
+4m	1.4	0.0	19.5	1	2	1023	
+4m 30s	1.3	0.0	19.5	1	2	1023	
+5m	1.3	0.0	19.6	1	2	1023	
Min	*1.3*	*0.0*	*18.9*	*1*	*1*	-	
Max	*2.2*	*0.0*	*19.6*	*2*	*2*	-	

Groundwater

Water Depth (m)	Dry
Well Depth (m)	1.96
Sample:	-
Comment:	-

agb Environmental Ltd

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	WS04
Date:	11/07/2022
Engineer:	HG
Weather / temp:	Air pressure high and falling. 27 C, sunny.

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	3.3	0.0	19.3	1	2	1023	
+30s	3.3	0.0	17.7	1	2	1023	
+1m	3.2	0.0	17.7	1	2	1023	
+1m 30s	3.2	0.0	17.8	1	2	1023	
+2m	3.0	0.0	17.8	1	2	1023	
+2m 30s	2.8	0.0	18.0	1	1	1023	
+3m	2.7	0.0	18.1	1	2	1023	
+3m 30s	2.5	0.0	18.2	1	2	1023	
+4m	2.4	0.0	18.3	1	2	1023	
+4m 30s	2.2	0.0	18.4	1	2	1023	
+5m	2.2	0.0	18.4	1	2	1023	
Min	*2.2*	*0.0*	*17.7*	*1*	*1*	-	
Max	*3.3*	*0.0*	*19.3*	*1*	*2*	-	

Groundwater

Water Depth (m)	Dry
Well Depth (m)	1.98
Sample:	-
Comment:	-

agb Environmental Ltd

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	CP01
Date:	21/07/2022
Engineer:	NM
Weather / temp:	Air pressure high and falling

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	5.0	0.0	14.2	2	3	1022	
+30s	5.1	0.0	13.3	2	3	1022	
+1m	5.1	0.0	13.2	2	3	1022	
+1m 30s	5.1	0.0	13.2	2	3	1022	
+2m	5.1	0.0	13.2	2	3	1022	
+2m 30s	5.1	0.0	13.2	2	3	1022	
+3m	5.1	0.0	13.2	2	3	1022	
+3m 30s	5.1	0.0	13.2	2	3	1022	
+4m	5.1	0.0	13.2	2	3	1022	
+4m 30s	5.1	0.0	13.2	2	3	1022	
+5m	5.1	0.0	13.2	2	3	1022	
Min	*5.0*	*0.0*	*13.2*	*2*	*3*	-	
Max	*5.1*	*0.0*	*14.2*	*2*	*3*	-	

Groundwater

Water Depth (m)	4.19m
Well Depth (m)	10.12m
Sample:	CP01, MON2, 4.20m
Comment:	-

agb Environmental Ltd

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	WS02
Date:	21/07/2022
Engineer:	NM
Weather / temp:	Air pressure high and falling

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	2.1	0.0	19.3	1	2	1021	
+30s	2.1	0.0	19.3	1	2	1021	
+1m	2.1	0.0	19.2	1	2	1021	
+1m 30s	2.1	0.0	19.2	1	2	1021	
+2m	2.1	0.0	19.3	1	2	1021	
+2m 30s	2.1	0.0	19.3	1	2	1021	
+3m	1.8	0.0	19.3	1	2	1021	
+3m 30s	1.8	0.0	19.3	1	2	1021	
+4m	1.8	0.0	19.4	1	2	1021	
+4m 30s	1.6	0.0	19.4	1	2	1021	
+5m	1.5	0.0	19.6	1	2	1021	
Min	*1.5*	*0.0*	*19.2*	*1*	*2*	-	
Max	*2.1*	*0.0*	*19.6*	*1*	*2*	-	

Groundwater

Water Depth (m)	Dry
Well Depth (m)	1.96
Sample:	-
Comment:	-

agb Environmental Ltd

Monitoring Record

Site name / location:	Sheldon House, Cromwell Road, Teddington, TW11 9EJ
Installation ref.:	WS04
Date:	21/07/2022
Engineer:	NM
Weather / temp:	Air pressure high and falling

PID Monitoring

	Reading		Reading
	ppm		ppm
Ambient	0.0	**+3m**	0.0
+10s	0.0	**+4m**	-
+30s	0.0	**+5m**	-
+1m	0.0	**+6m**	-
+1m 30s	0.0	**+7m**	-
+2m	0.0	**+8m**	-
		Max	*0.0*

Flow Rate

	Reading
	l/hr
+10s	0.0
+30s	0.0
+1m	0.0
+1m 30s	0.0
+2m	0.0
Max	*0.0*

Gas Monitoring

	CO2	CH4	O2	CO	H2S	Pressure	Comments
	%	%	%	ppm	ppm	mb	
+10s	0.1	0.0	20.6	3	2	1021	
+30s	2.9	0.0	18.7	1	2	1021	
+1m	3.6	0.0	17.9	1	2	1021	
+1m 30s	3.6	0.0	17.9	1	2	1021	
+2m	3.6	0.0	17.9	1	2	1021	
+2m 30s	3.5	0.0	18.0	1	2	1021	
+3m	3.3	0.0	18.0	1	2	1021	
+3m 30s	3.3	0.0	18.0	1	2	1021	
+4m	3.0	0.0	18.3	1	2	1021	
+4m 30s	3.0	0.0	18.6	1	2	1021	
+5m	2.7	0.0	18.6	1	2	1021	
Min	*0.1*	*0.0*	*17.9*	*1*	*2*	-	
Max	*3.6*	*0.0*	*20.6*	*3*	*2*	-	

Groundwater

Water Depth (m)	Dry
Well Depth (m)	1.98
Sample:	-
Comment:	-

agb Environmental Ltd

Appendix 4 Laboratory Results

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Derwentside Environmental Testing Services Ltd
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Kent
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DETS Report No: 22-05652

Site Reference:	P4301.3 - Sheldon House, Teddington
Project / Job Ref:	P4301.3
Order No:	9232
Sample Receipt Date:	01/07/2022
Sample Scheduled Date:	01/07/2022
Report Issue Number:	1
Reporting Date:	07/07/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.

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Soil Analysis Certificate						
DETS Report No: 22-05652	**Date Sampled**	28/06/22	28/06/22	28/06/22	28/06/22	28/06/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS01	WS02	WS02	WS03	WS03
Project / Job Ref: P4301.3	**Additional Refs**	ES1	ES3	ES3 + DS3	ES1	ES1 + DS1
Order No: 9232	**Depth (m)**	0.30	1.00	1.00	0.30	0.30
Reporting Date: 07/07/2022	**DETS Sample No**	603240	603241	603242	603243	603244

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected		Not Detected	
pH	pH Units	N/a	MCERTS	8.4	7.9		6.7	
Total Sulphate as SO_4	mg/kg	< 200	MCERTS					
Total Sulphate as SO_4	%	< 0.02	MCERTS					
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS					
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS					
Total Sulphur	%	< 0.02	NONE					
Organic Matter (SOM)	%	< 0.1	MCERTS	6.2	2.5		6.1	
Arsenic (As)	mg/kg	< 2	MCERTS	13	12		26	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.3		0.5	
Chromium (Cr)	mg/kg	< 2	MCERTS	14	13		14	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2		< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	18	23		63	
Lead (Pb)	mg/kg	< 3	MCERTS	77	137		635	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1		< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	14	11		16	
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3		< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	40	70		589	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 22-05652	**Date Sampled**	28/06/22	28/06/22	28/06/22	28/06/22	28/06/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS04	TP01	WS02	WS04	WS01
Project / Job Ref: P4301.3	**Additional Refs**	ES2	ES1	ES1	ES4	ES3
Order No: 9232	**Depth (m)**	0.50	0.20	0.20	1.20	1.00
Reporting Date: 07/07/2022	**DETS Sample No**	603245	603246	603247	603248	603249

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	7.6	8.0	7.0	8.5	7.8
Total Sulphate as SO_4	mg/kg	< 200	MCERTS			302	450	633
Total Sulphate as SO_4	%	< 0.02	MCERTS			0.03	0.05	0.06
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS			< 10	13	227
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS			< 0.01	0.01	0.23
Total Sulphur	%	< 0.02	NONE			< 0.02	< 0.02	0.02
Organic Matter (SOM)	%	< 0.1	MCERTS	1.2	2			
Arsenic (As)	mg/kg	< 2	MCERTS	9	11			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	15	16			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	7	25			
Lead (Pb)	mg/kg	< 3	MCERTS	16	214			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	11	12			
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	40	106			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-05652	**Date Sampled**	28/06/22	28/06/22	28/06/22	28/06/22	28/06/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS01	WS02	WS03	WS04	TP01
Project / Job Ref: P4301.3	**Additional Refs**	ES1	ES3	ES1	ES2	ES1
Order No: 9232	**Depth (m)**	0.30	1.00	0.30	0.50	0.20
Reporting Date: 07/07/2022	**DETS Sample No**	603240	603241	603243	603245	603246

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.12	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	1.15	0.20	< 0.1	0.11
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.35	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	1.65	0.12	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	18	2.39	< 0.1	1.25
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	4.44	0.48	< 0.1	0.26
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	28.70	6.38	< 0.1	3.23
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	25.10	6.04	< 0.1	2.86
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	13.30	3.63	< 0.1	1.67
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	11	2.37	< 0.1	1.37
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	11.50	3.28	< 0.1	1.70
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	4.24	1.10	< 0.1	0.52
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	12.60	3.30	< 0.1	1.60
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	7.38	2	< 0.1	1.04
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	2.07	0.44	< 0.1	0.28
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	6.37	1.71	< 0.1	0.93
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	148	33.4	< 1.6	16.8

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-05652	**Date Sampled**	28/06/22	28/06/22	28/06/22	28/06/22	28/06/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS01	WS02	WS03	WS04	TP01
Project / Job Ref: P4301.3	**Additional Refs**	ES1	ES3	ES1	ES2	ES1
Order No: 9232	**Depth (m)**	0.30	1.00	0.30	0.50	0.20
Reporting Date: 07/07/2022	**DETS Sample No**	603240	603241	603243	603245	603246

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_1D_FID_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_1D_FID_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_1D_FID_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21 : EH_1D_FID_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34 : EH_1D_FID_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34) : EH_1D_FID_MS_HS_AL	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_1D_FID_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_1D_FID_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_1D_FID_AR	mg/kg	< 2	MCERTS	< 2	5	< 2	< 2	< 2
Aromatic >C16 - C21 : EH_1D_FID_AR	mg/kg	< 3	MCERTS	< 3	52	10	< 3	5
Aromatic >C21 - C35 : EH_1D_FID_AR	mg/kg	< 10	MCERTS	< 10	114	32	< 10	17
Aromatic (C5 - C35) : EH_1D_FID_MS_HS_AR	mg/kg	< 21	NONE	< 21	171	42	< 21	22
Total >C5 - C35 : EH_1D_FID_MS_HS_Total	mg/kg	< 42	NONE	< 42	171	42	< 42	< 42

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-05652	**Date Sampled**	28/06/22	28/06/22	28/06/22	28/06/22	28/06/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS01	WS02	WS03	WS04	TP01
Project / Job Ref: P4301.3	**Additional Refs**	ES1	ES3	ES1	ES2	ES1
Order No: 9232	**Depth (m)**	0.30	1.00	0.30	0.50	0.20
Reporting Date: 07/07/2022	**DETS Sample No**	603240	603241	603243	603245	603246

Determinand	Unit	RL	Accreditation					
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - PCB (12 Congeners)						
DETS Report No: 22-05652	**Date Sampled**	28/06/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS03				
Project / Job Ref: P4301.3	**Additional Refs**	ES1				
Order No: 9232	**Depth (m)**	0.30				
Reporting Date: 07/07/2022	**DETS Sample No**	603243				

Determinand	**Unit**	**RL**	**Accreditation**				
PCB Congener 77	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 81	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 105	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 114	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 118	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 123	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 126	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 156	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 157	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 167	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 169	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 189	mg/kg	< 0.008	NONE	< 0.008			
Total PCB (12 Congeners)	mg/kg	< 0.1	NONE	< 0.1			

Analytical rsults are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

DETS Report No: 22-05652	**Date Sampled**	28/06/22	
AGB Environmental Ltd	**Time Sampled**	None Supplied	
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	WS02	
Project / Job Ref: P4301.3	**Additional Refs**	ES3 + DS3	
Order No: 9232	**Depth (m)**	1.00	
Reporting Date: 07/07/2022	**DETS Sample No**	603242	

Determinand	**Unit**	**MDL**		**Landfill Waste Acceptance Criteria Limits**		
				Inert Waste Landfill	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
TOC[MU]	%	< 0.1	0.6	3%	5%	6%
Loss on Ignition	%	< 0.01	1.50	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10	500	--	--
Total PAH[MU]	mg/kg	< 1.7	4.4	100	--	--
pH[MU]	pH Units	N/a	8.0	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1	--	To be evaluated	To be evaluated

Eluate Analysis	**2:1 mg/l**	**8:1 mg/l**		**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01	< 0.01		< 0.2	0.5	2	25
Barium[U]	< 0.02	< 0.02		0.1	20	100	300
Cadmium[U]	< 0.0005	< 0.0005		< 0.02	0.04	1	5
Chromium[U]	< 0.005	< 0.005		< 0.20	0.5	10	70
Copper[U]	< 0.01	< 0.01		< 0.5	2	50	100
Mercury[U]	< 0.0005	< 0.0005		< 0.005	0.01	0.2	2
Molybdenum[U]	0.007	0.003		< 0.1	0.5	10	30
Nickel[U]	< 0.007	< 0.007		< 0.2	0.4	10	40
Lead[U]	< 0.005	< 0.005		< 0.2	0.5	10	50
Antimony[U]	< 0.005	< 0.005		< 0.05	0.06	0.7	5
Selenium[U]	< 0.005	< 0.005		< 0.05	0.1	0.5	7
Zinc[U]	< 0.005	0.007		< 0.2	4	50	200
Chloride[U]	21	5		63	800	15000	25000
Fluoride[U]	< 0.5	< 0.5		< 1	10	150	500
Sulphate[U]	13	6		60	1000	20000	50000
TDS	106	47		511	4000	60000	100000
Phenol Index	< 0.01	< 0.01		< 0.5	1	-	-
DOC	25.1	8.9		101	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.18						
Dry Matter (%)	95.7						
Moisture (%)	4.6						
Stage 1							
Volume Eluate L2 (litres)	0.34						
Filtered Eluate VE1 (litres)	0.12						

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

DETS Report No: 22-05652		**Date Sampled**	28/06/22			**Landfill Waste Acceptance Criteria Limits**	
AGB Environmental Ltd		**Time Sampled**	None Supplied			**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Site Reference: P4301.3 - Sheldon House, Teddington		**TP / BH No**	WS03					
Project / Job Ref: P4301.3		**Additional Refs**	ES1 + DS1					
Order No: 9232		**Depth (m)**	0.30					
Reporting Date: 07/07/2022		**DETS Sample No**	603244					
Determinand	**Unit**	**MDL**						
TOC[MU]	%	< 0.1	5.8			3%	**5%**	6%
Loss on Ignition	%	< 0.01	8.88			--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05			6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1			1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10			500	--	--
Total PAH[MU]	mg/kg	< 1.7	20.6			100	--	--
pH[MU]	pH Units	N/a	6.7			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1			--	To be evaluated	To be evaluated

Eluate Analysis	**2:1 mg/l**	**8:1 mg/l**		**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01	< 0.01		< 0.2	0.5	2	25
Barium[U]	0.04	0.04		0.4	20	100	300
Cadmium[U]	< 0.0005	< 0.0005		< 0.02	0.04	1	5
Chromium[U]	< 0.005	< 0.005		< 0.20	0.5	10	70
Copper[U]	0.01	< 0.01		< 0.5	2	50	100
Mercury[U]	< 0.0005	< 0.0005		< 0.005	0.01	0.2	2
Molybdenum[U]	0.004	0.003		< 0.1	0.5	10	30
Nickel[U]	< 0.007	< 0.007		< 0.2	0.4	10	40
Lead[U]	0.030	0.034		0.3	0.5	10	50
Antimony[U]	0.014	0.006		0.06	**0.06**	0.7	5
Selenium[U]	< 0.005	< 0.005		< 0.05	0.1	0.5	7
Zinc[U]	0.024	0.049		0.5	4	50	200
Chloride[U]	4	3		35	800	15000	25000
Fluoride[U]	< 0.5	< 0.5		< 1	10	150	500
Sulphate[U]	7	5		56	1000	20000	50000
TDS	56	52		524	4000	60000	100000
Phenol Index	< 0.01	< 0.01		< 0.5	1	-	-
DOC	20.6	16.2		166	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.19						
Dry Matter (%)	93.6						
Moisture (%)	6.8						
Stage 1							
Volume Eluate L2 (litres)	0.34						
Filtered Eluate VE1 (litres)	0.16						

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 22-05652
AGB Environmental Ltd
Site Reference: P4301.3 - Sheldon House, Teddington
Project / Job Ref: P4301.3
Order No: 9232
Reporting Date: 07/07/2022

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
603240	WS01	ES1	0.30	4.6	Brown sandy clay with stones and concrete
603241	WS02	ES3	1.00	5.5	Brown gravelly sand with stones and concrete
603242	WS02	ES3 + DS3	1.00	4.3	Light brown sandy clay with stones
603243	WS03	ES1	0.30	6.4	Light brown sandy clay
603244	WS03	ES1 + DS1	0.30	6.3	Light brown sandy clay
603245	WS04	ES2	0.50	4.9	Black sandy clay with stones and glass
603246	TP01	ES1	0.20	4.9	Black sandy clay with stones and vegetation
603247	WS02	ES1	0.20	5.4	Light brown sandy clay
603248	WS04	ES4	1.20	6.8	Brown sandy clay with stones
603249	WS01	ES3	1.00	4.6	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 22-05652

AGB Environmental Ltd

Site Reference: P4301.3 - Sheldon House, Teddington

Project / Job Ref: P4301.3

Order No: 9232

Reporting Date: 07/07/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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UKAS TESTING
4480

Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-05652
AGB Environmental Ltd
Site Reference: P4301.3 - Sheldon House, Teddington
Project / Job Ref: P4301.3
Order No: 9232
Reporting Date: 07/07/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichlorometha	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainity Measurement	Unit
TOC	Soil	BS EN 12457	20.0	%
Loss on Ignition	Soil	BS EN 12457	35.0	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	23.0	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	11.6	%
pH	Soil	BS EN 12457	0.28	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	18.7	%
Barium	Leachate	BS EN 12457	11.6	%
Cadmium	Leachate	BS EN 12457	20.3	%
Chromium	Leachate	BS EN 12457	18.3	%
Copper	Leachate	BS EN 12457	24.3	%
Mercury	Leachate	BS EN 12457	23.7	%
Molybdenum	Leachate	BS EN 12457	14.7	%
Nickel	Leachate	BS EN 12457	16.1	%
Lead	Leachate	BS EN 12457	15.7	%
Antimony	Leachate	BS EN 12457	17.9	%
Selenium	Leachate	BS EN 12457	22.0	%
Zinc	Leachate	BS EN 12457	17.4	%
Chloride	Leachate	BS EN 12457	15.3	%
Fluoride	Leachate	BS EN 12457	16.4	%
Sulphate	Leachate	BS EN 12457	20.6	%
TDS	Leachate	BS EN 12457	12.0	%
Phenol Index	Leachate	BS EN 12457	14.0	%
DOC	Leachate	BS EN 12457	10.0	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	35.0	%
pH	Soil	BS 3882: 2015	0.14	Units
Carbonate	Soil	BS 3882: 2015	16.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	14.9	%
Copper	Soil	BS 3882: 2015	16.0	%
Nickel	Soil	BS 3882: 2015	17.7	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
Mineral Oil (C10 - C40) (BS EN 12457-3) - EH_1D_FID
TPH CWG - Aliphatic >C10 - C12 - EH_1D_FID_AL
TPH CWG - Aliphatic >C12 - C16 - EH_1D_FID_AL
TPH CWG - Aliphatic >C16 - C21 - EH_1D_FID_AL
TPH CWG - Aliphatic >C21 - C34 - EH_1D_FID_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_1D_FID_AL
TPH CWG - Aliphatic C5 - C34 - EH_1D_FID_MS_HS_AL
TPH CWG - Aromatic >C10 - C12 - EH_1D_FID_AR
TPH CWG - Aromatic >C12 - C16 - EH_1D_FID_AR
TPH CWG - Aromatic >C16 - C21 - EH_1D_FID_AR
TPH CWG - Aromatic >C21 - C35 - EH_1D_FID_AR
TPH CWG - Aromatic >C5 - C35 - EH_1D_FID_MS_HS_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_1D_FID_AR
TPH CWG - Total >C5 - C35 - EH_1D_FID_MS_HS_Total
Toluene - HS_1D_MS
Total BTEX (BS EN 12457-3) - HS_1D_MS_Total
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

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DETS Report No: 22-05766

Site Reference:	P4301.3 - Sheldon House, Teddington
Project / Job Ref:	P4301.3
Order No:	009248
Sample Receipt Date:	06/07/2022
Sample Scheduled Date:	06/07/2022
Report Issue Number:	1
Reporting Date:	11/07/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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Soil Analysis Certificate						
DETS Report No: 22-05766	**Date Sampled**	30/06/22	30/06/22	01/07/22	04/07/22	04/07/22
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	CP01	CP01	CP01	CP01	CP01
Project / Job Ref: P4301.3	**Additional Refs**	ES1	ES3	ES	ES	ES
Order No: 009248	**Depth (m)**	0.30	1.20	7.00	12.00	15.00
Reporting Date: 11/07/2022	**DETS Sample No**	603668	603669	603670	603671	603672

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	9.7	7.7	8.3	8.3	8.2
Total Sulphate as SO_4	mg/kg	< 200	MCERTS		297	< 200	554	608
Total Sulphate as SO_4	%	< 0.02	MCERTS		0.03	< 0.02	0.06	0.06
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS		53	< 10	150	148
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS		0.05	< 0.01	0.15	0.15
Total Sulphur	%	< 0.02	NONE		< 0.02	< 0.02	0.33	0.65
Organic Matter (SOM)	%	< 0.1	MCERTS	3.4				
Arsenic (As)	mg/kg	< 2	MCERTS	11				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (Cr)	mg/kg	< 2	MCERTS	19				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	36				
Lead (Pb)	mg/kg	< 3	MCERTS	241				
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	13				
Selenium (Se)	mg/kg	< 2	MCERTS	< 3				
Zinc (Zn)	mg/kg	< 3	MCERTS	121				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 22-05766	**Date Sampled**	04/07/22	04/07/22	04/07/22		
AGB Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	CP01	CP01	CP01		
Project / Job Ref: P4301.3	**Additional Refs**	ES	ES	ES		
Order No: 009248	**Depth (m)**	18.00	21.00	24.00		
Reporting Date: 11/07/2022	**DETS Sample No**	603673	603674	603675		

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025					
pH	pH Units	N/a	MCERTS	8.9	8.7	6.8		
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	545	570	555		
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.05	0.06	0.06		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	108	150	141		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.11	0.15	0.14		
Total Sulphur	%	< 0.02	NONE	0.28	0.43	0.39		
Organic Matter (SOM)	%	< 0.1	MCERTS					
Arsenic (As)	mg/kg	< 2	MCERTS					
Cadmium (Cd)	mg/kg	< 0.2	MCERTS					
Chromium (Cr)	mg/kg	< 2	MCERTS					
Chromium (hexavalent)	mg/kg	< 2	NONE					
Copper (Cu)	mg/kg	< 4	MCERTS					
Lead (Pb)	mg/kg	< 3	MCERTS					
Mercury (Hg)	mg/kg	< 1	MCERTS					
Nickel (Ni)	mg/kg	< 3	MCERTS					
Selenium (Se)	mg/kg	< 2	MCERTS					
Zinc (Zn)	mg/kg	< 3	MCERTS					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-05766	**Date Sampled**	30/06/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	CP01				
Project / Job Ref: P4301.3	**Additional Refs**	ES1				
Order No: 009248	**Depth (m)**	0.30				
Reporting Date: 11/07/2022	**DETS Sample No**	603668				

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1				
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1				
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6				

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-05766	**Date Sampled**	30/06/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	CP01				
Project / Job Ref: P4301.3	**Additional Refs**	ES1				
Order No: 009248	**Depth (m)**	0.30				
Reporting Date: 11/07/2022	**DETS Sample No**	603668				

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10 : EH_1D_FID_AL	mg/kg	< 2	**MCERTS**	< 2				
Aliphatic >C10 - C12 : EH_1D_FID_AL	mg/kg	< 2	**MCERTS**	< 2				
Aliphatic >C12 - C16 : EH_1D_FID_AL	mg/kg	< 3	**MCERTS**	< 3				
Aliphatic >C16 - C21 : EH_1D_FID_AL	mg/kg	< 3	**MCERTS**	< 3				
Aliphatic >C21 - C34 : EH_1D_FID_AL	mg/kg	< 10	**MCERTS**	< 10				
Aliphatic (C5 - C34) : EH_1D_FID_MS_HS_AL	mg/kg	< 21	NONE	< 21				
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10 : EH_1D_FID_AR	mg/kg	< 2	**MCERTS**	< 2				
Aromatic >C10 - C12 : EH_1D_FID_AR	mg/kg	< 2	**MCERTS**	< 2				
Aromatic >C12 - C16 : EH_1D_FID_AR	mg/kg	< 2	**MCERTS**	< 2				
Aromatic >C16 - C21 : EH_1D_FID_AR	mg/kg	< 3	**MCERTS**	< 3				
Aromatic >C21 - C35 : EH_1D_FID_AR	mg/kg	< 10	**MCERTS**	< 10				
Aromatic (C5 - C35) : EH_1D_FID_MS_HS_AR	mg/kg	< 21	NONE	< 21				
Total >C5 - C35 : EH_1D_FID_MS_HS_Total	mg/kg	< 42	NONE	< 42				

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-05766	**Date Sampled**	30/06/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: P4301.3 - Sheldon House, Teddington	**TP / BH No**	CP01				
Project / Job Ref: P4301.3	**Additional Refs**	ES1				
Order No: 009248	**Depth (m)**	0.30				
Reporting Date: 11/07/2022	**DETS Sample No**	603668				

Determinand	Unit	RL	Accreditation					
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				

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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 22-05766
AGB Environmental Ltd
Site Reference: P4301.3 - Sheldon House, Teddington
Project / Job Ref: P4301.3
Order No: 009248
Reporting Date: 11/07/2022

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
603668	CP01	ES1	0.30	8.9	Brown sandy clay with brick and concrete
603669	CP01	ES3	1.20	13.5	Light brown sandy clay
603670	CP01	ES	7.00	4.2	Brown sandy clay with stones
603671	CP01	ES	12.00	20.1	Brown clay
603672	CP01	ES	15.00	22.4	Brown clay
603673	CP01	ES	18.00	18.8	Brown clay
603674	CP01	ES	21.00	21.1	Brown clay
603675	CP01	ES	24.00	21.4	Brown clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 22-05766

AGB Environmental Ltd

Site Reference: P4301.3 - Sheldon House, Teddington

Project / Job Ref: P4301.3

Order No: 009248

Reporting Date: 11/07/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_1D_FID_AL
TPH CWG - Aliphatic >C12 - C16 - EH_1D_FID_AL
TPH CWG - Aliphatic >C16 - C21 - EH_1D_FID_AL
TPH CWG - Aliphatic >C21 - C34 - EH_1D_FID_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_1D_FID_AL
TPH CWG - Aliphatic C5 - C34 - EH_1D_FID_MS_HS_AL
TPH CWG - Aromatic >C10 - C12 - EH_1D_FID_AR
TPH CWG - Aromatic >C12 - C16 - EH_1D_FID_AR
TPH CWG - Aromatic >C16 - C21 - EH_1D_FID_AR
TPH CWG - Aromatic >C21 - C35 - EH_1D_FID_AR
TPH CWG - Aromatic >C5 - C35 - EH_1D_FID_MS_HS_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_1D_FID_AR
TPH CWG - Total >C5 - C35 - EH_1D_FID_MS_HS_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

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Derwentside Environmental Testing Services Ltd
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Lenham Heath
Kent
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DETS Report No: 22-05987

Site Reference:	Sheldon House, Teddington
Project / Job Ref:	P4301.3
Order No:	009260
Sample Receipt Date:	13/07/2022
Sample Scheduled Date:	13/07/2022
Report Issue Number:	1
Reporting Date:	18/07/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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UKAS TESTING 4480

Water Analysis Certificate						
DETS Report No: 22-05987	**Date Sampled**	11/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON1				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009260	**Depth (m)**	4.15				
Reporting Date: 18/07/2022	**DETS Sample No**	604797				

Determinand	**Unit**	**RL**	**Accreditation**					
pH	pH Units	N/a	**ISO17025**	7.3				
Sulphate as SO_4	mg/l	< 1	**ISO17025**	103				
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	7.1				
Arsenic (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Cadmium (dissolved)	ug/l	< 0.4	**ISO17025**	0.4				
Chromium (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Chromium (hexavalent)	ug/l	< 20	NONE	< 20				
Copper (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Lead (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Mercury (dissolved)	ug/l	< 0.05	**ISO17025**	< 0.05				
Nickel (dissolved)	ug/l	< 5	**ISO17025**	18				
Selenium (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Zinc (dissolved)	ug/l	< 2	**ISO17025**	105				

Subcontracted analysis (S)
Insufficient sample I/S
Unsuitable Sample U/S

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Water Analysis Certificate - Speciated PAH						
DETS Report No: 22-05987	**Date Sampled**	11/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON1				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009260	**Depth (m)**	4.15				
Reporting Date: 18/07/2022	**DETS Sample No**	604797				

Determinand	**Unit**	**RL**	**Accreditation**				
Naphthalene	ug/l	< 0.01	NONE	< 0.01			
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01			
Acenaphthene	ug/l	< 0.01	NONE	< 0.01			
Fluorene	ug/l	< 0.01	NONE	< 0.01			
Phenanthrene	ug/l	< 0.01	NONE	< 0.01			
Anthracene	ug/l	< 0.01	NONE	< 0.01			
Fluoranthene	ug/l	< 0.01	NONE	< 0.01			
Pyrene	ug/l	< 0.01	NONE	< 0.01			
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01			
Chrysene	ug/l	< 0.01	NONE	< 0.01			
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01			
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01			
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01			
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01			
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01			
Benzo(ghi)perylene	ug/l	< 0.008	NONE	< 0.008			
Total EPA-16 PAHs	ug/l	< 0.16	NONE	< 0.16			

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Water Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-05987	**Date Sampled**	11/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON1				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009260	**Depth (m)**	4.15				
Reporting Date: 18/07/2022	**DETS Sample No**	604797				

Determinand	**Unit**	**RL**	**Accreditation**					
Aliphatic >C5 - C6 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C6 - C8 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C8 - C10 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C10 - C12 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C12 - C16 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C16 - C21 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C21 - C34 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic (C5 - C34) : EH_1D_FID_MS_HS_AL	ug/l	< 70	NONE	< 70				
Aromatic >C5 - C7 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10				
Aromatic >C7 - C8 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10				
Aromatic >C8 - C10 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C10 - C12 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C12 - C16 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C16 - C21 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C21 - C35 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic (C5 - C35) : EH_1D_FID_MS_HS_AR	ug/l	< 70	NONE	< 70				
Total >C5 - C35 : EH_1D_FID_MS_HS_Total	ug/l	< 140	NONE	< 140				

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Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-05987	**Date Sampled**	11/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON1				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009260	**Depth (m)**	4.15				
Reporting Date: 18/07/2022	**DETS Sample No**	604797				

Determinand	Unit	RL	Accreditation					
Benzene : HS_1D_MS	ug/l	< 1	ISO17025	< 1				
Toluene : HS_1D_MS	ug/l	< 5	ISO17025	< 5				
Ethylbenzene : HS_1D_MS	ug/l	< 5	ISO17025	< 5				
p & m-xylene : HS_1D_MS	ug/l	< 10	ISO17025	< 10				
o-xylene : HS_1D_MS	ug/l	< 5	ISO17025	< 5				
MTBE : HS_1D_MS	ug/l	< 10	ISO17025	< 10				

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Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-05987
AGB Environmental Ltd
Site Reference: Sheldon House, Teddington
Project / Job Ref: P4301.3
Order No: 009260
Reporting Date: 18/07/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichlorometha	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_1D_FID_AL
TPH CWG - Aliphatic >C12 - C16 - EH_1D_FID_AL
TPH CWG - Aliphatic >C16 - C21 - EH_1D_FID_AL
TPH CWG - Aliphatic >C21 - C34 - EH_1D_FID_AL
TPH CWG - Aliphatic >C5 - C34 - EH_1D_FID_MS_HS_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_1D_FID_AL
TPH CWG - Aromatic >C10 - C12 - EH_1D_FID_AR
TPH CWG - Aromatic >C12 - C16 - EH_1D_FID_AR
TPH CWG - Aromatic >C16 - C21 - EH_1D_FID_AR
TPH CWG - Aromatic >C21 - C35 - EH_1D_FID_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_1D_FID_AR
TPH CWG - Aromatic C5 - C35 - EH_1D_FID_MS_HS_AR
TPH CWG - Total >C5 - C35 - EH_1D_FID_MS_HS_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Natasha Masich
AGB Environmental Ltd
1 The Mill
Copley Hill Business Park
Abraham Road
Cambridge
CB22 3GN

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 22-06311

Site Reference:	Sheldon House, Teddington
Project / Job Ref:	P4301.3
Order No:	009275
Sample Receipt Date:	25/07/2022
Sample Scheduled Date:	25/07/2022
Report Issue Number:	1
Reporting Date:	29/07/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

UKAS TESTING 4480

Water Analysis Certificate						
DETS Report No: 22-06311	**Date Sampled**	21/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON2				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009275	**Depth (m)**	4.20				
Reporting Date: 29/07/2022	**DETS Sample No**	606204				

Determinand	**Unit**	**RL**	**Accreditation**	(hs)				
pH	pH Units	N/a	**ISO17025**	7.3				
Sulphate as SO_4	mg/l	< 1	**ISO17025**	105				
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	7.2				
Arsenic (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Cadmium (dissolved)	ug/l	< 0.4	**ISO17025**	< 0.4				
Chromium (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Chromium (hexavalent)	ug/l	< 20	NONE	< 20				
Copper (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Lead (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Mercury (dissolved)	ug/l	< 0.05	**ISO17025**	< 0.05				
Nickel (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Selenium (dissolved)	ug/l	< 5	**ISO17025**	< 5				
Zinc (dissolved)	ug/l	< 2	**ISO17025**	< 2				

Subcontracted analysis (S)
Insufficient sample I/S
Unsuitable Sample U/S
(hs) Please note deviating sample due to head space in container

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Water Analysis Certificate - Speciated PAH						
DETS Report No: 22-06311	**Date Sampled**	21/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON2				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009275	**Depth (m)**	4.20				
Reporting Date: 29/07/2022	**DETS Sample No**	606204				

Determinand	**Unit**	**RL**	**Accreditation**	(hs)				
Naphthalene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthene	ug/l	< 0.01	NONE	< 0.01				
Fluorene	ug/l	< 0.01	NONE	< 0.01				
Phenanthrene	ug/l	< 0.01	NONE	< 0.01				
Anthracene	ug/l	< 0.01	NONE	< 0.01				
Fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Pyrene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01				
Chrysene	ug/l	< 0.01	NONE	< 0.01				
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01				
Benzo(ghi)perylene	ug/l	< 0.008	NONE	< 0.008				
Total EPA-16 PAHs	ug/l	< 0.16	NONE	< 0.16				

DETS Ltd
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Rose Lane
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Water Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-06311	**Date Sampled**	21/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON2				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009275	**Depth (m)**	4.20				
Reporting Date: 29/07/2022	**DETS Sample No**	606204				

Determinand	**Unit**	**RL**	**Accreditation**	(hs)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C6 - C8 : HS_1D_MS_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C8 - C10 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C10 - C12 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C12 - C16 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C16 - C21 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic >C21 - C34 : EH_1D_FID_AL	ug/l	< 10	NONE	< 10				
Aliphatic (C5 - C34) : EH_1D_FID_MS_HS_AL	ug/l	< 70	NONE	< 70				
Aromatic >C5 - C7 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10				
Aromatic >C7 - C8 : HS_1D_MS_AR	ug/l	< 10	NONE	< 10				
Aromatic >C8 - C10 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C10 - C12 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C12 - C16 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C16 - C21 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic >C21 - C35 : EH_1D_FID_AR	ug/l	< 10	NONE	< 10				
Aromatic (C5 - C35) : EH_1D_FID_MS_HS_AR	ug/l	< 70	NONE	< 70				
Total >C5 - C35 : EH_1D_FID_MS_HS_Total	ug/l	< 140	NONE	< 140				

(hs) Please note deviating sample due to head space in container

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Rose Lane
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Maidstone
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4480

Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 22-06311	**Date Sampled**	21/07/22				
AGB Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Sheldon House, Teddington	**TP / BH No**	CP01 MON2				
Project / Job Ref: P4301.3	**Additional Refs**	P4301				
Order No: 009275	**Depth (m)**	4.20				
Reporting Date: 29/07/2022	**DETS Sample No**	606204				

Determinand	**Unit**	**RL**	**Accreditation**	(hs)				
Benzene : HS_1D_MS	ug/l	< 1	**ISO17025**	< 1				
Toluene : HS_1D_MS	ug/l	< 5	**ISO17025**	< 5				
Ethylbenzene : HS_1D_MS	ug/l	< 5	**ISO17025**	< 5				
p & m-xylene : HS_1D_MS	ug/l	< 10	**ISO17025**	< 10				
o-xylene : HS_1D_MS	ug/l	< 5	**ISO17025**	< 5				
MTBE : HS_1D_MS	ug/l	< 10	**ISO17025**	< 10				

(hs) Please note deviating sample due to head space in container

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
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UKAS TESTING
4480

Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-06311
AGB Environmental Ltd
Site Reference: Sheldon House, Teddington
Project / Job Ref: P4301.3
Order No: 009275
Reporting Date: 29/07/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichlorometha	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_1D_FID_AL
TPH CWG - Aliphatic >C12 - C16 - EH_1D_FID_AL
TPH CWG - Aliphatic >C16 - C21 - EH_1D_FID_AL
TPH CWG - Aliphatic >C21 - C34 - EH_1D_FID_AL
TPH CWG - Aliphatic >C5 - C34 - EH_1D_FID_MS_HS_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_1D_FID_AL
TPH CWG - Aromatic >C10 - C12 - EH_1D_FID_AR
TPH CWG - Aromatic >C12 - C16 - EH_1D_FID_AR
TPH CWG - Aromatic >C16 - C21 - EH_1D_FID_AR
TPH CWG - Aromatic >C21 - C35 - EH_1D_FID_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_1D_FID_AR
TPH CWG - Aromatic C5 - C35 - EH_1D_FID_MS_HS_AR
TPH CWG - Total >C5 - C35 - EH_1D_FID_MS_HS_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

Client:

AGB Environmental Ltd

341 Exning Road
Newmarket
Suffolk
CB8 0AT

Soil Property Testing Ltd

15, 16, 18 Halcyon Court, St Margaret's Way,
Stukeley Meadows, Huntingdon,
Cambridgeshire, PE29 6DG

Tel: 01480 455579
Email: enquiries@soilpropertytesting.com
Website: www.soilpropertytesting.com

Samples Submitted By:

AGB Environmental Ltd

Samples Labelled:

P4301 - Sheldon House, Teddington

Approved Signatories:

☑ **J.C. Garner B.Eng (Hons) FGS**
Technical Director & Quality Manager

☐ **W. Johnstone**
Materials Lab Manager

Date Received: 06/07/2022	**Samples Tested Between:** 06/07/2022 **and** 19/07/2022

Remarks:

For the attention of Helen Gildersleeves
Your Reference No: P4301
Your Order No: 9249

Notes:

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.
2. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.
4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.
5. The results within this report only relate to the items tested or sampled.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

Contract	**P4301 - Sheldon House, Teddington**		
Serial No.	**41057_1**	**Target Date**	20/07/2022
Scheduled By	AGB Environmental Ltd		
Schedule Remarks			

Bore Hole No.	Type	Sample Ref.	Top Depth	Particle Size Distribution (BS1377)	Water Content (BSEN)	Liquid/Plastic Limits	Wet Sieve Preparation	Triaxial Test														Sample Remarks
CP01	B	-	2.00	1																		
CP01	B	-	4.00	1																		
CP01	B	-	7.00	1																		
CP01	D	-	8.00		1	1																
CP01	D	-	9.00		1	1																
CP01	U	1	10.50					1														
CP01	D	-	11.00		1	1																
CP01	D	-	13.00		1	1																
CP01	U	2	14.00					1														
CP01	D	-	15.00		1	1																
CP01	U	3	17.00					1														
CP01	D	-	18.00		1	1																
CP01	D	-	21.00		1	1																
CP01	U	4	21.00					1														
CP01	D	-	24.00		1	1																
TP03	D	-	1.30		1	1	1															
WS02	D	-	1.40		1	1	1															
Totals				**3**	**10**	**10**	**2**	**4**														**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
CP01	8.00	D	-	**25.2**	63	23	40	0.06	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CH
CP01	9.00	D	-	**24.2**	61	23	38	0.03	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CH
CP01	11.00	D	-	**24.0**	61	22	39	0.05	From Natural	0 (A)		25	Stiff fissured dark grey CLAY	CH
CP01	13.00	D	-	**27.4**	68	26	42	0.03	From Natural	0 (A)		25	Stiff fissured dark grey CLAY	CH
CP01	15.00	D	-	**33.7**	73	25	48	0.18	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CV
CP01	18.00	D	-	**28.1**	71	25	46	0.07	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CV
CP01	21.00	D	-	**25.0**	70	24	46	0.02	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CH/CV
CP01	24.00	D	-	**29.3**	74	26	48	0.07	From Natural	0 (A)		24	Stiff fissured dark grey CLAY	CV

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:

Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured

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Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
TP03	1.30	D	-	**10.1**	29	14	15	-0.26	Wet Sieved	3 (M)	10.4*	25	Very stiff yellowish brown sandy silty CLAY with occasional recently active and decayed roots	CL
WS02	1.40	D	-	**7.9**	30	16	14	-0.58	Wet Sieved	32 (M)	11.5*	24	Hard yellowish brown slightly gravelly slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse angular and subangular chert	CL

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments: *Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.

Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured

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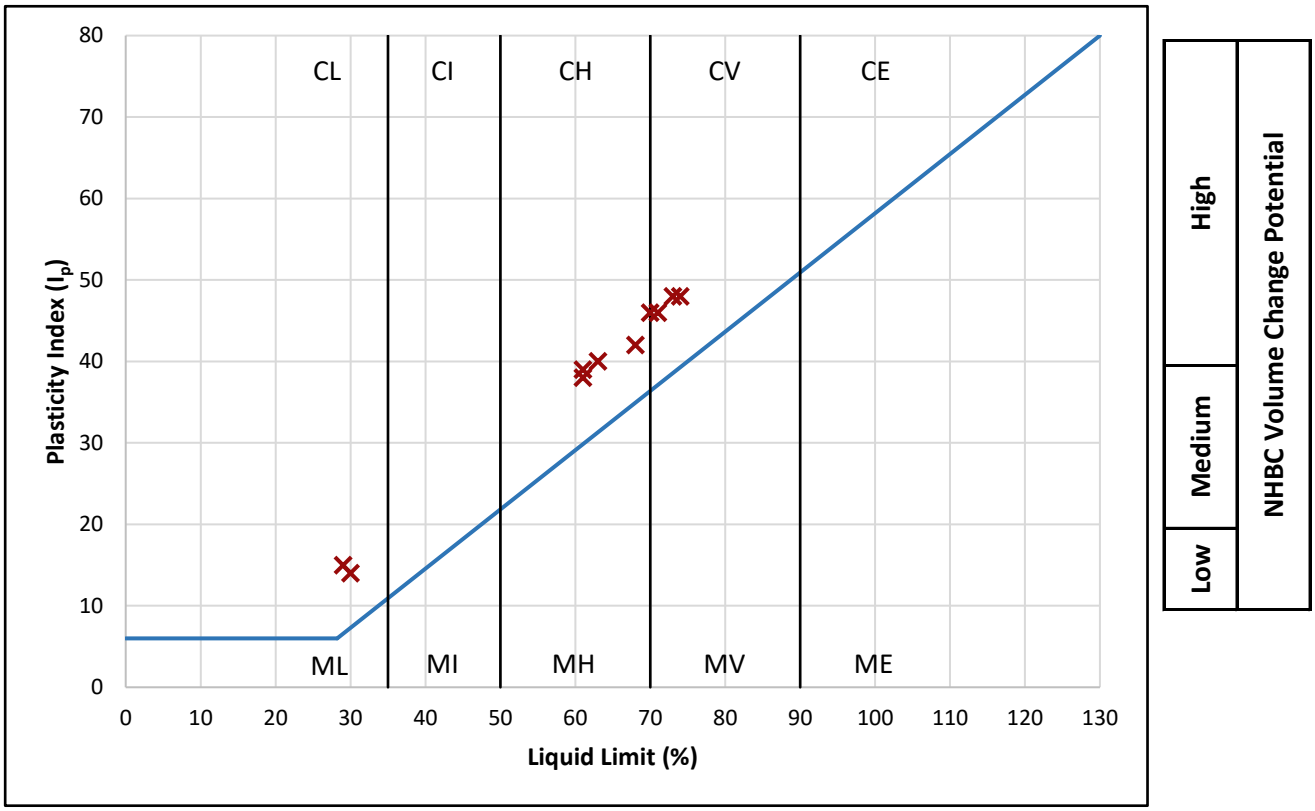
PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS 1377: Part 2: 1990: 4.2
Method of Test:	BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index

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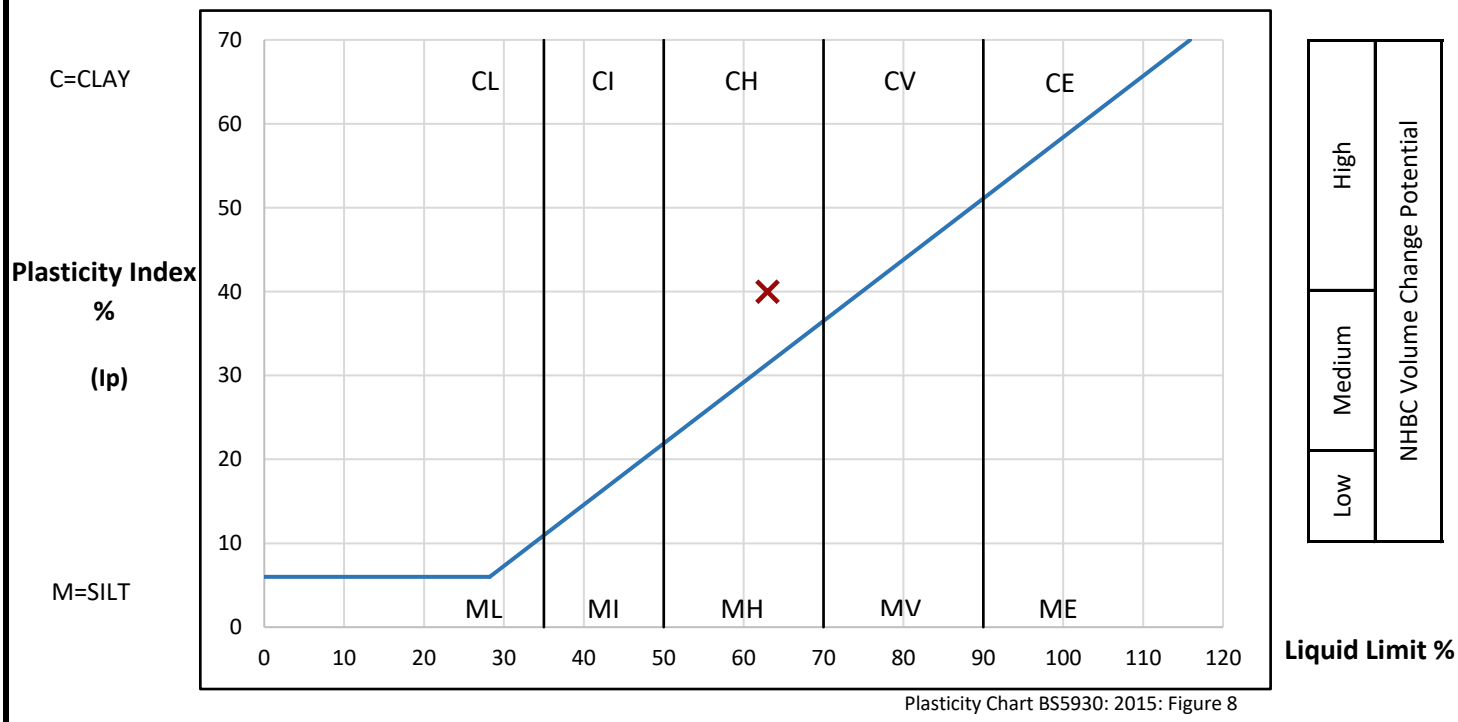
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	8.00	D	-	25.2	Stiff fissured dark grey CLAY	

PREPARATION			Liquid Limit	63 %
Method of preparation		From natural	Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	40 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.06
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content: Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4

Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter

Comments:

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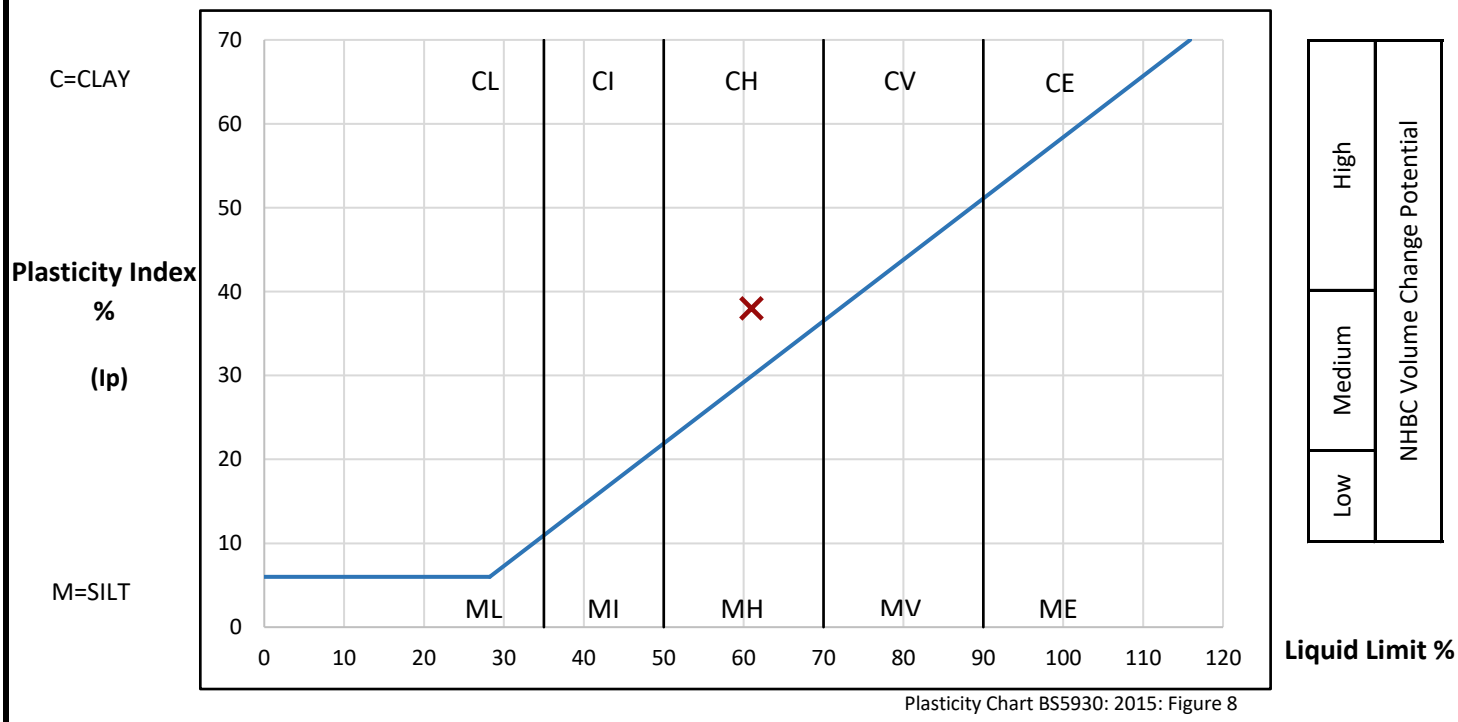
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	9.00	D	-	24.2	Stiff fissured dark grey CLAY	

PREPARATION				Liquid Limit	61 %
Method of preparation		From natural		Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	38 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.03
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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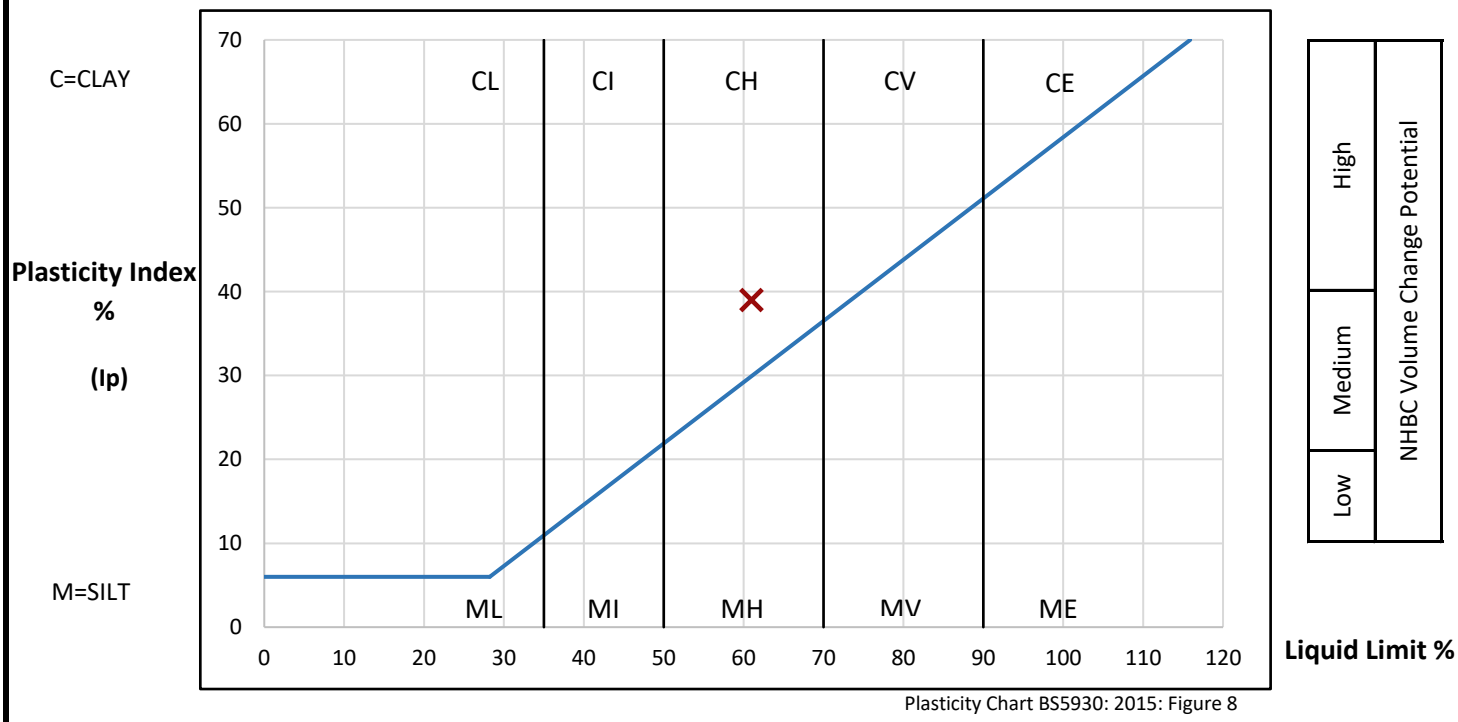
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	11.00	D	-	24.0	Stiff fissured dark grey CLAY	

PREPARATION				Liquid Limit	61 %
Method of preparation		From natural		Plastic Limit	22 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	39 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.05
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	25 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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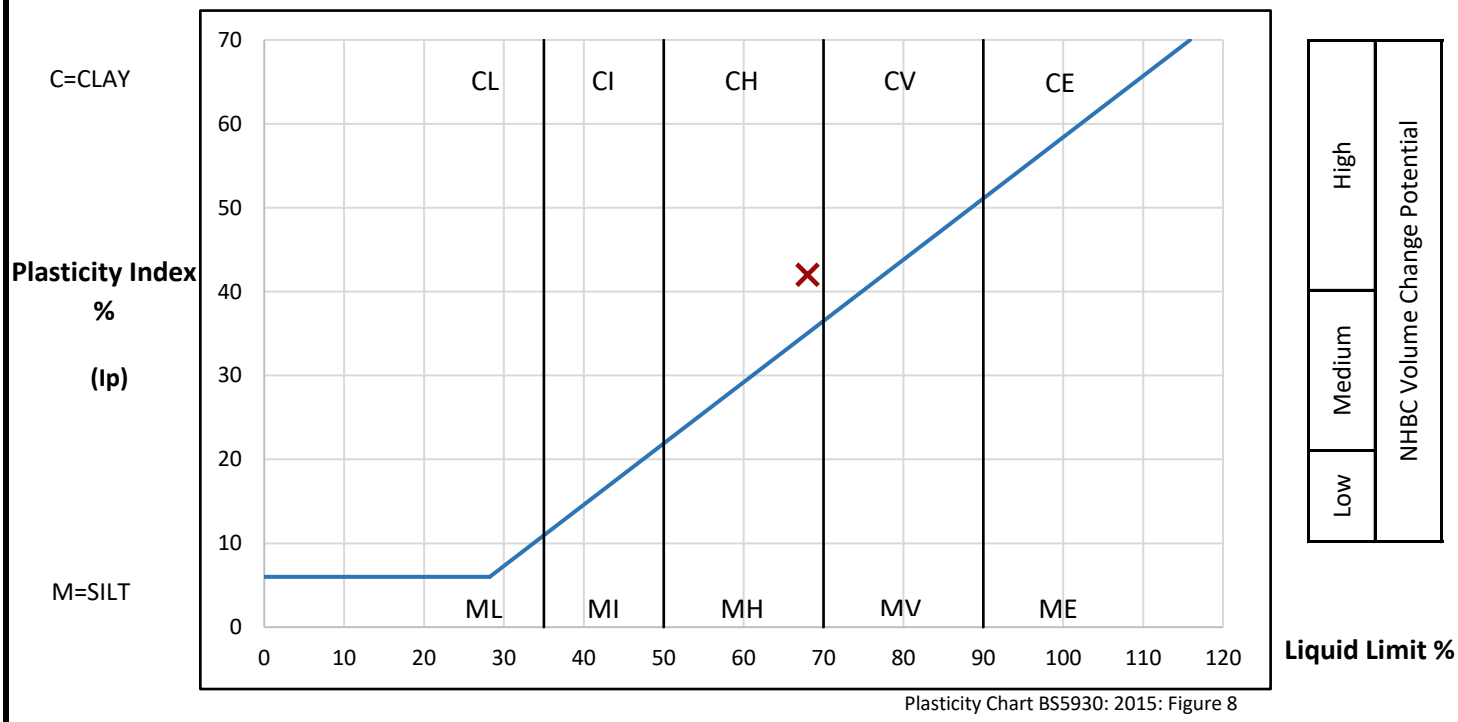
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	13.00	D	-	27.4	Stiff fissured dark grey CLAY	

PREPARATION			Liquid Limit	68 %
Method of preparation		From natural	Plastic Limit	26 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	42 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.03
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	25 hrs	Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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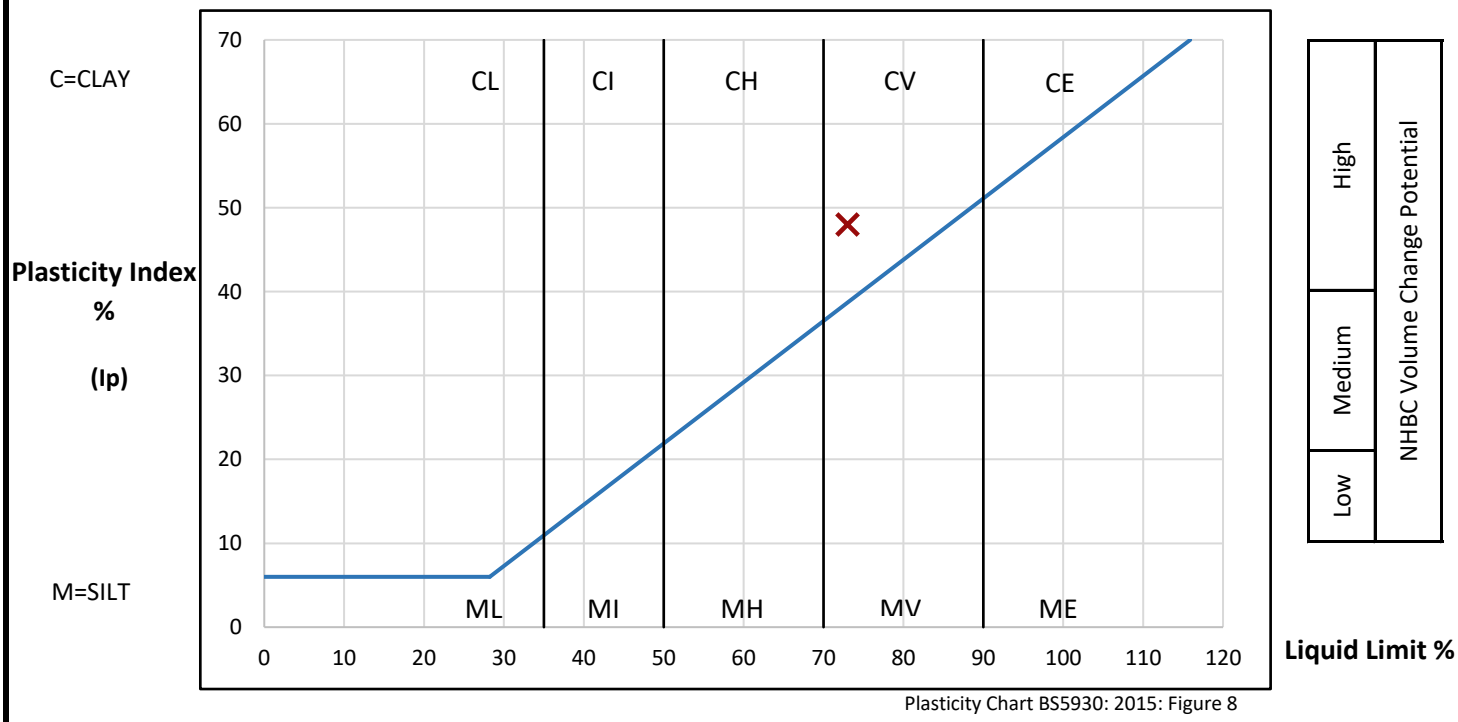
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	15.00	D	-	33.7	Stiff fissured dark grey CLAY	

PREPARATION			Liquid Limit	73 %
Method of preparation		From natural	Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	48 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.18
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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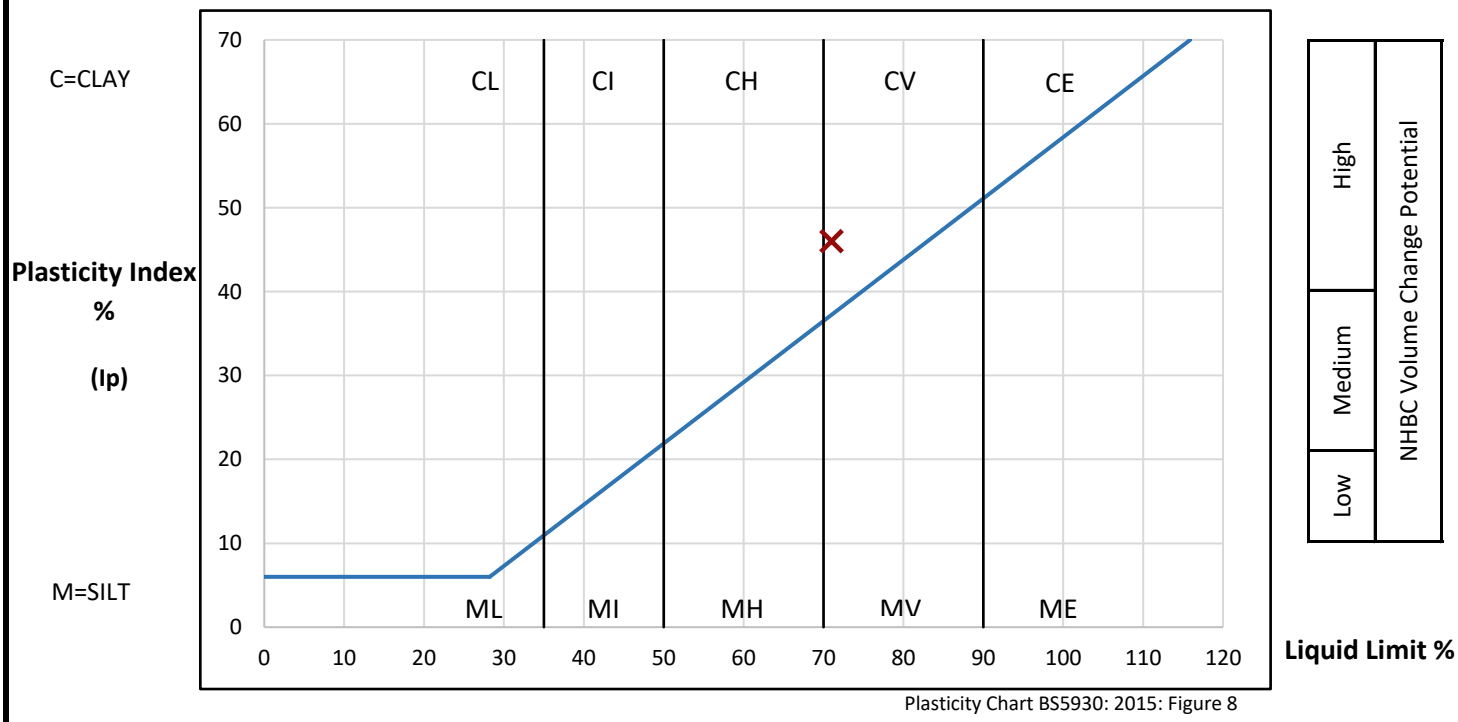
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	18.00	D	-	28.1	Stiff fissured dark grey CLAY	

PREPARATION				Liquid Limit	71 %
Method of preparation		From natural		Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	46 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.07
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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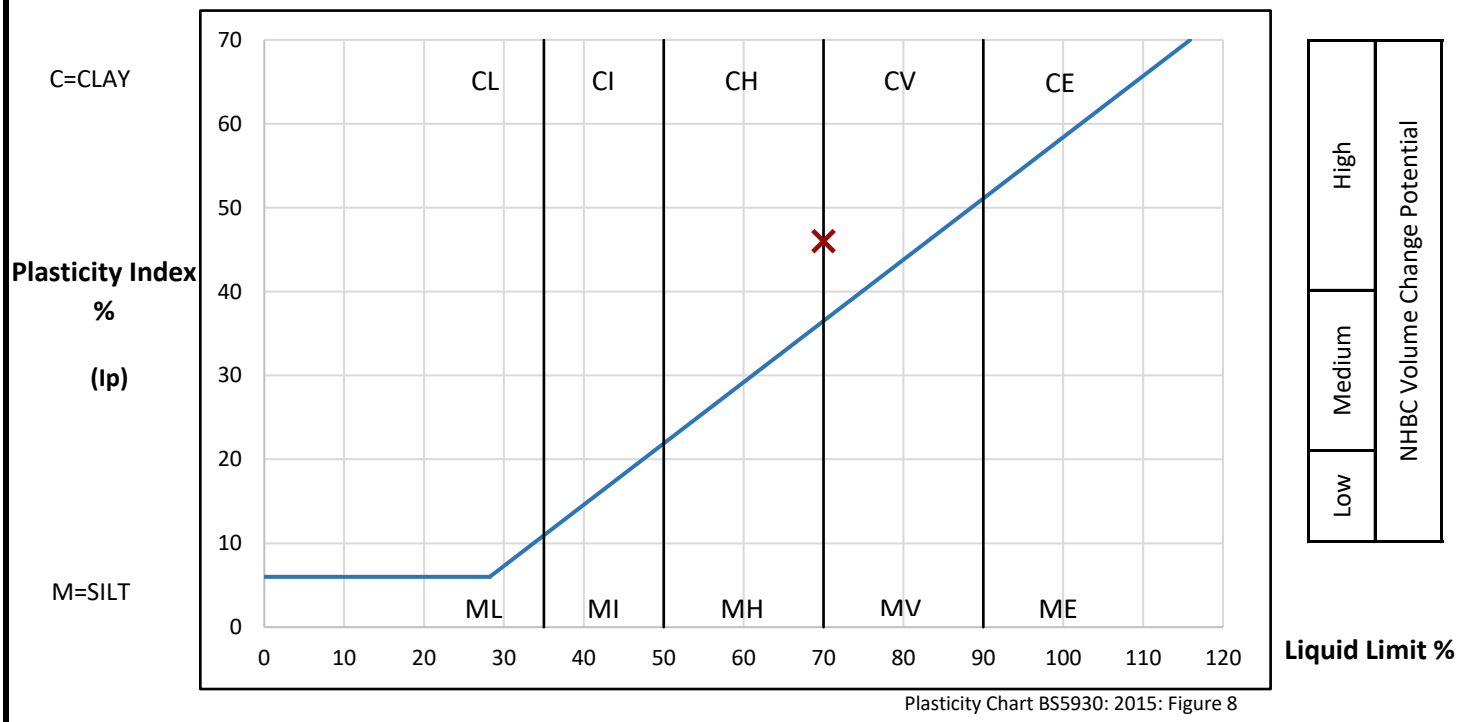
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	21.00	D	-	25.0	Stiff fissured dark grey CLAY	

PREPARATION				Liquid Limit	70 %
Method of preparation		From natural		Plastic Limit	24 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	46 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.02
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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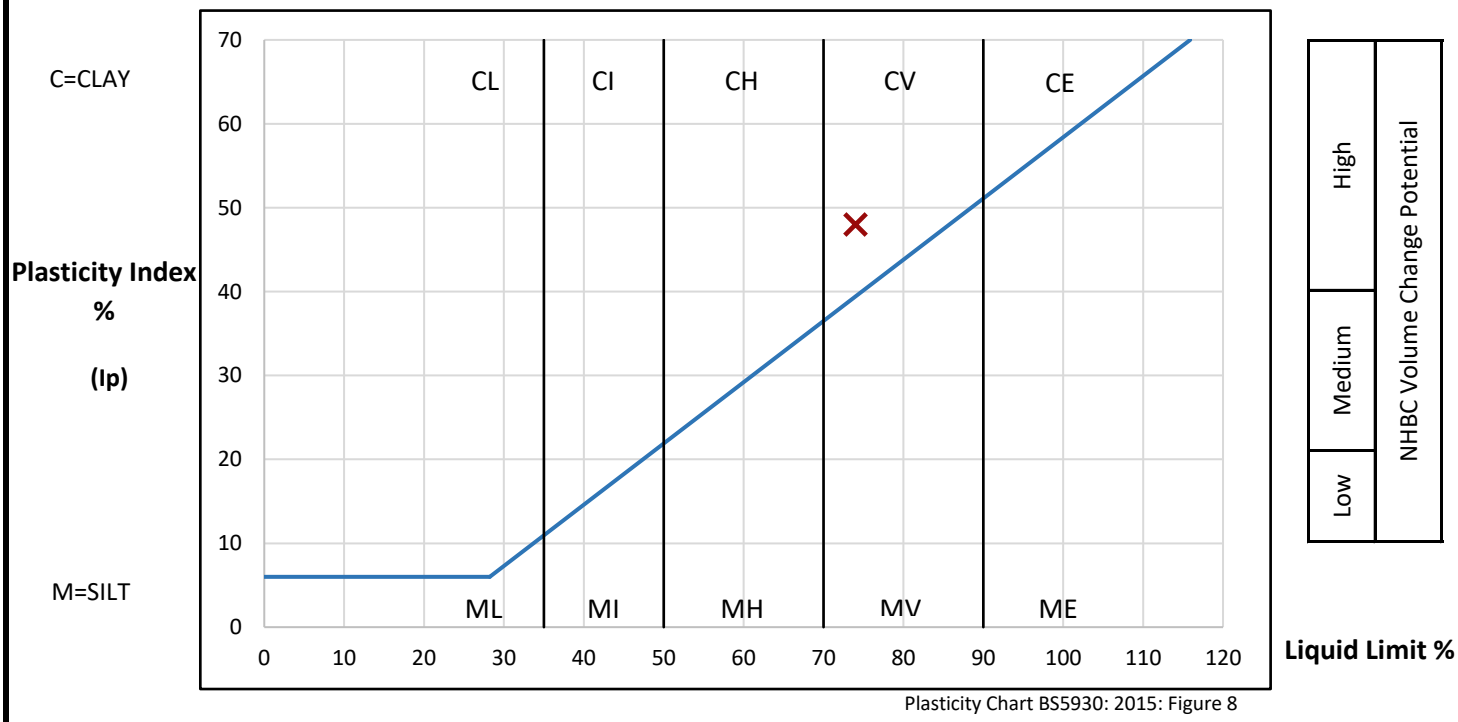
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
CP01	24.00	D	-	29.3	Stiff fissured dark grey CLAY	

PREPARATION			Liquid Limit	74 %
Method of preparation		From natural	Plastic Limit	26 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	48 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.07
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	24 hrs	Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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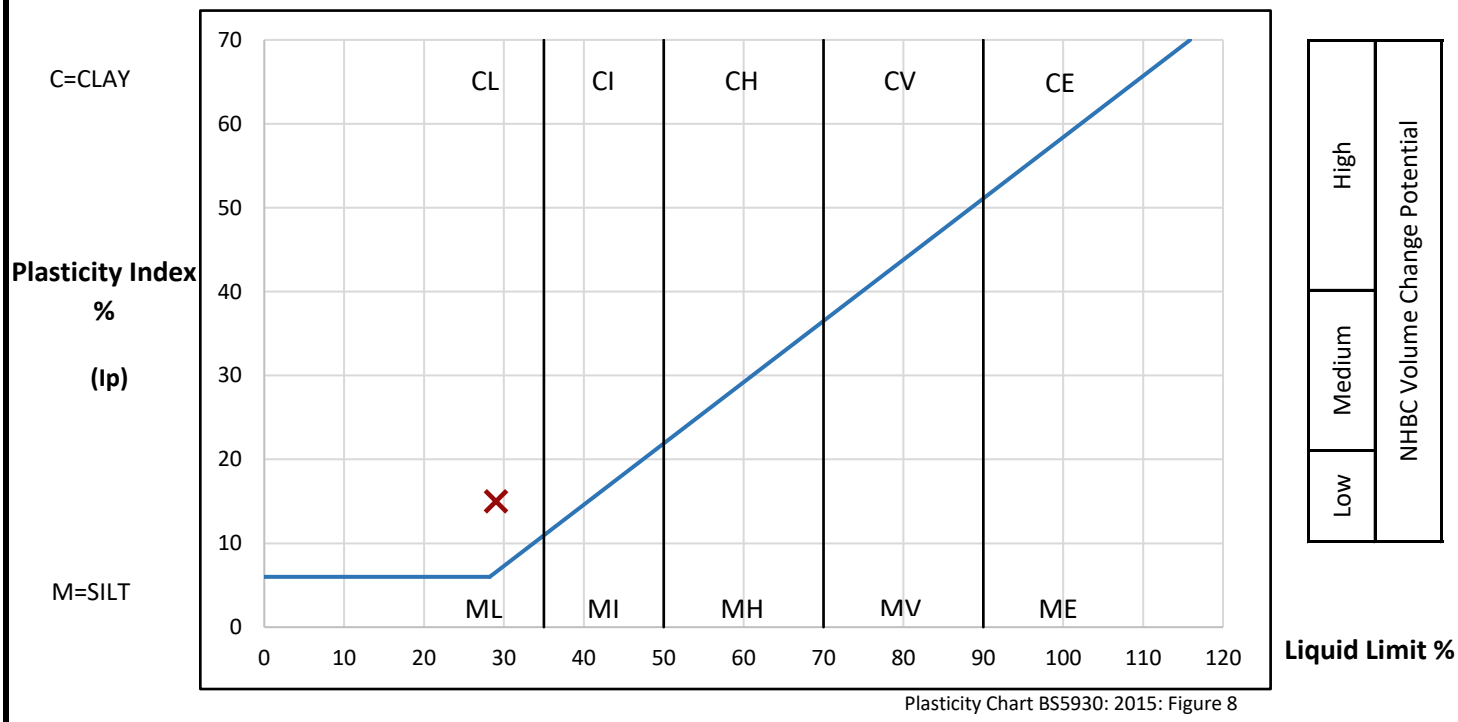
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
TP03	1.30	D	-	10.1	Very stiff yellowish brown sandy silty CLAY with occasional recently active and decayed roots	

PREPARATION				Liquid Limit	29 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	14 %
Sample retained 0.425mm sieve	(Measured)	3 %		Plasticity Index	15 %
Corrected water content for material passing 0.425mm		10.4 %		Liquidity Index	-0.26
Sample retained 2mm sieve	(Measured)	<1 %		NHBC Modified (I'p)	15 %
Curing time	25 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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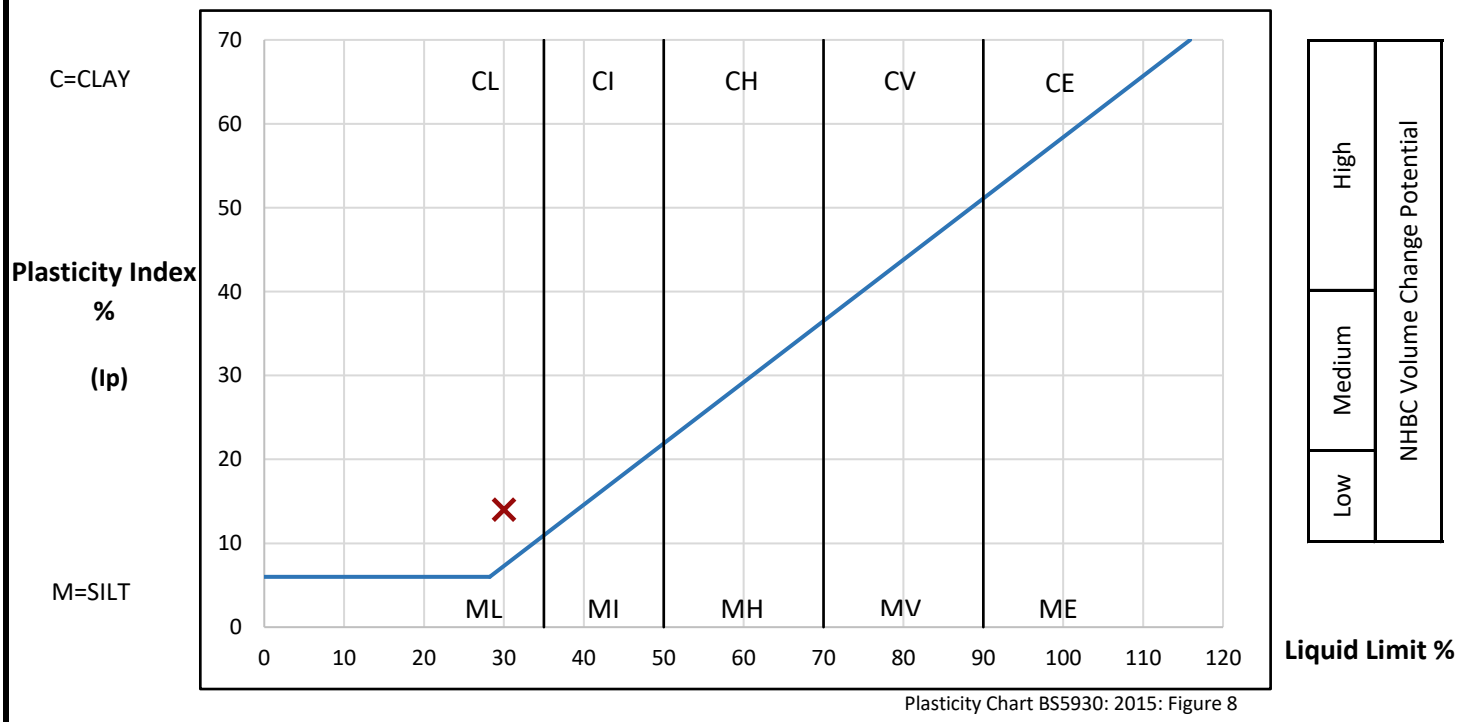
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS02	1.40	D	-	7.9	Hard yellowish brown slightly gravelly slightly sandy silty CLAY with occasional recently active and decayed roots. Gravel is fine to coarse angular and subangular chert	

PREPARATION				Liquid Limit	30 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	16 %
Sample retained 0.425mm sieve	(Measured)	32 %		Plasticity Index	14 %
Corrected water content for material passing 0.425mm		11.5 %		Liquidity Index	-0.58
Sample retained 2mm sieve	(Measured)	21 %		NHBC Modified (I'p)	10 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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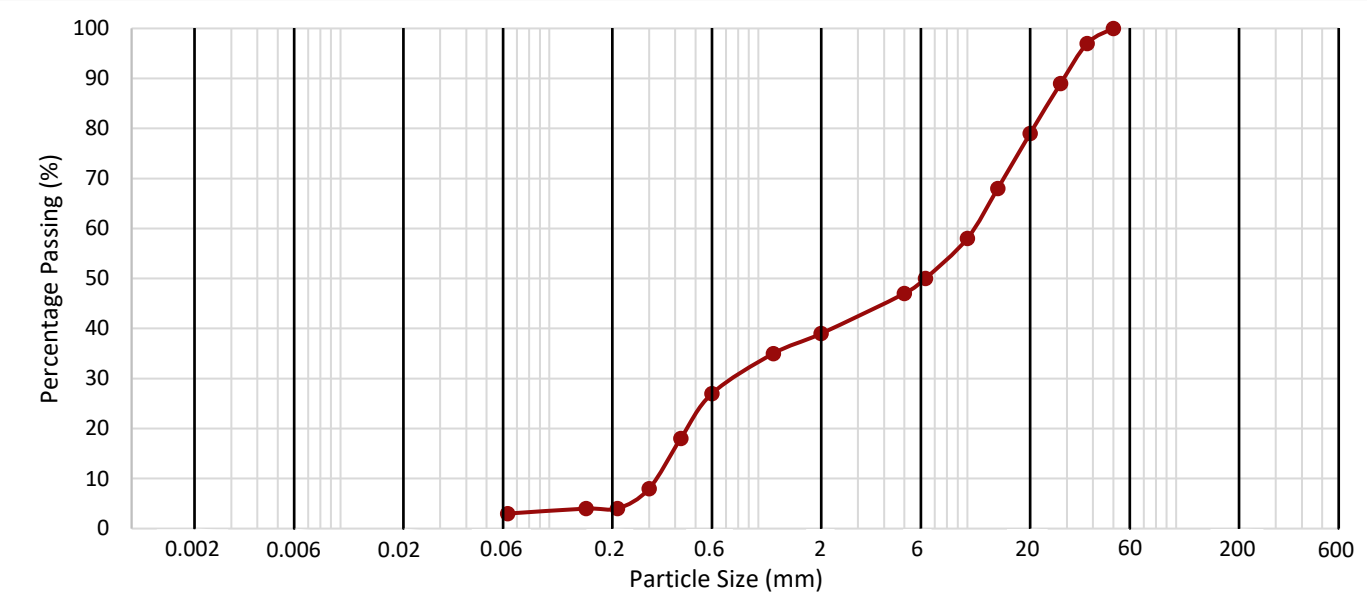
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
CP01	2.00	B	-	Black, brown and white subangular and subrounded slightly silty very sandy chert GRAVEL. Sand is yellowish brown	

Method of Test:	Wet Sieve	Method of Pretreatment:	Not required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	39	36
1.18	35	
0.600	27	
0.425	18	
0.300	8	
0.212	4	
0.150	4	
0.063	3	

Fines By Dry Mass (%)	
<0.063mm	3

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		61
125		
90		
63		
50	100	
37.5	97	
28	89	
20	79	
14	68	
10	58	
6.3	50	
5	47	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part 2: 1990: 9.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

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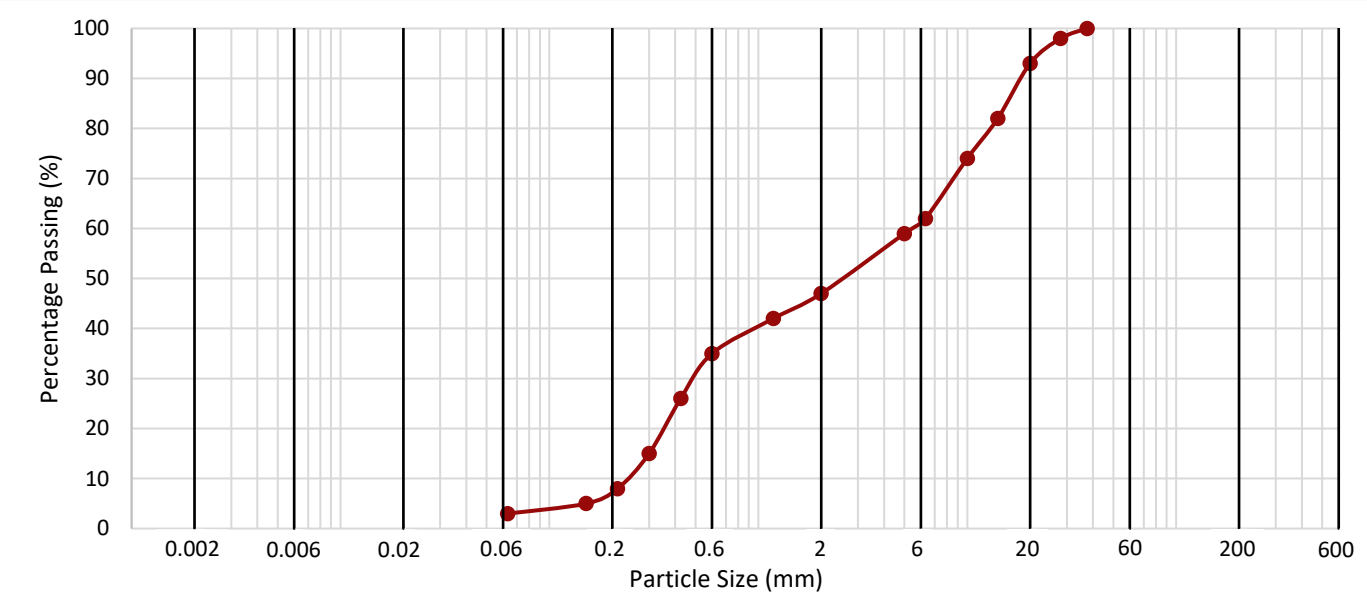
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
CP01	4.00	B	-	Black, brown and white subangular and subrounded slightly silty very sandy chert GRAVEL. Sand is yellowish brown	

Method of Test:	Wet Sieve	Method of Pretreatment:	Not required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	47	44
1.18	42	
0.600	35	
0.425	26	
0.300	15	
0.212	8	
0.150	5	
0.063	3	

Fines By Dry Mass (%)	
<0.063mm	3

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		53
125		
90		
63		
50		
37.5	100	
28	98	
20	93	
14	82	
10	74	
6.3	62	
5	59	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part 2: 1990: 9.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

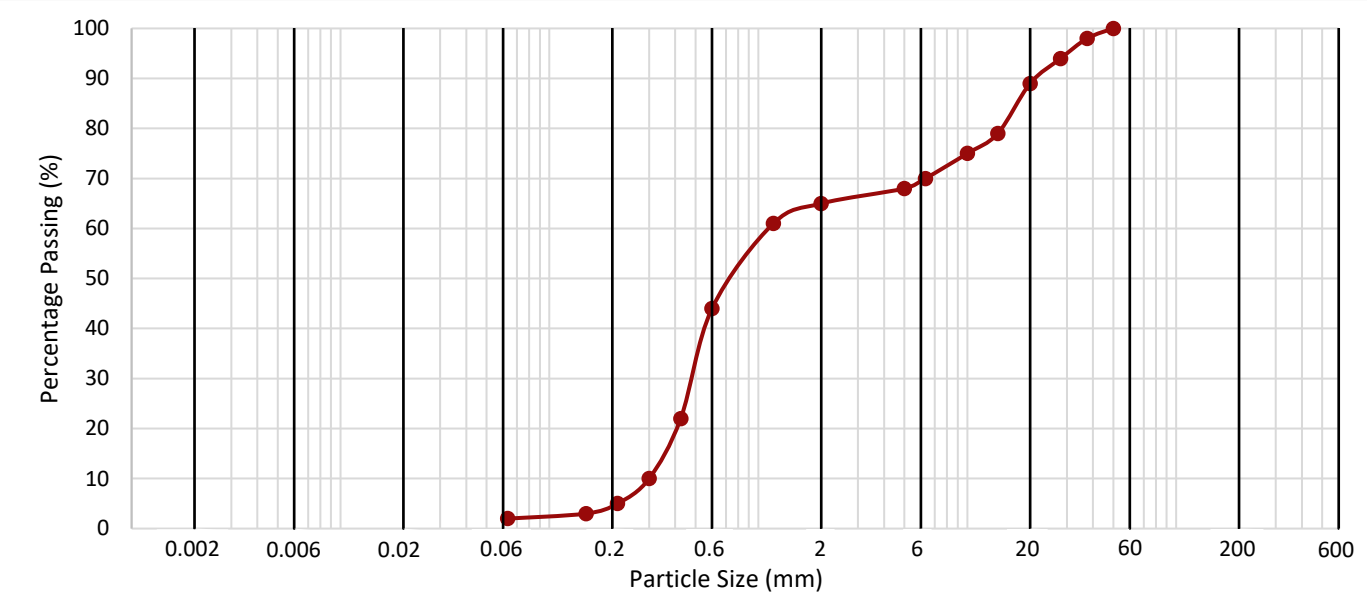
0998

Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
CP01	7.00	B	-	Yellowish brown slightly silty very gravelly SAND. Gravel is black, brown and white subangular and subrounded chert	

Method of Test:	Wet Sieve	Method of Pretreatment:	Not required



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	65	63
1.18	61	
0.600	44	
0.425	22	
0.300	10	
0.212	5	
0.150	3	
0.063	2	

Fines By Dry Mass (%)	
<0.063mm	2

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		35
125		
90		
63		
50	100	
37.5	98	
28	94	
20	89	
14	79	
10	75	
6.3	70	
5	68	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part 2: 1990: 9.2
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Lateral Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	Mohrs Circle Analysis		Description
										Cu (kPa)	Ø degrees	
CP01	10.50	U	1	27.1	2.01	1.58	206	241	121			Stiff (high strength) fissured dark grey CLAY
CP01	14.04	U	2	28.8	1.98	1.54	280	284	142			Stiff (high strength) fissured dark grey CLAY
CP01	17.03	U	3	29.8	1.99	1.53	340	297	149			Stiff (high strength) fissured dark grey CLAY
CP01	21.06	U	4	25.4	2.04	1.63	420	474	237			Very stiff (very high strength) fissured dark grey CLAY

Method of Preparation:	BS 1377: Part 1: 1990: 7.4.2 & 8, Part 2: 1990: 7.2, Part 7: 1990: 8.3
Method of Test:	BS 1377: Part 2: 1990:3 Determination of Moisture Content, Part2: 1990:7 Determination of Density, Part 7: 1990: 8 Undrained Shear Strength, 9 Multistage Loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

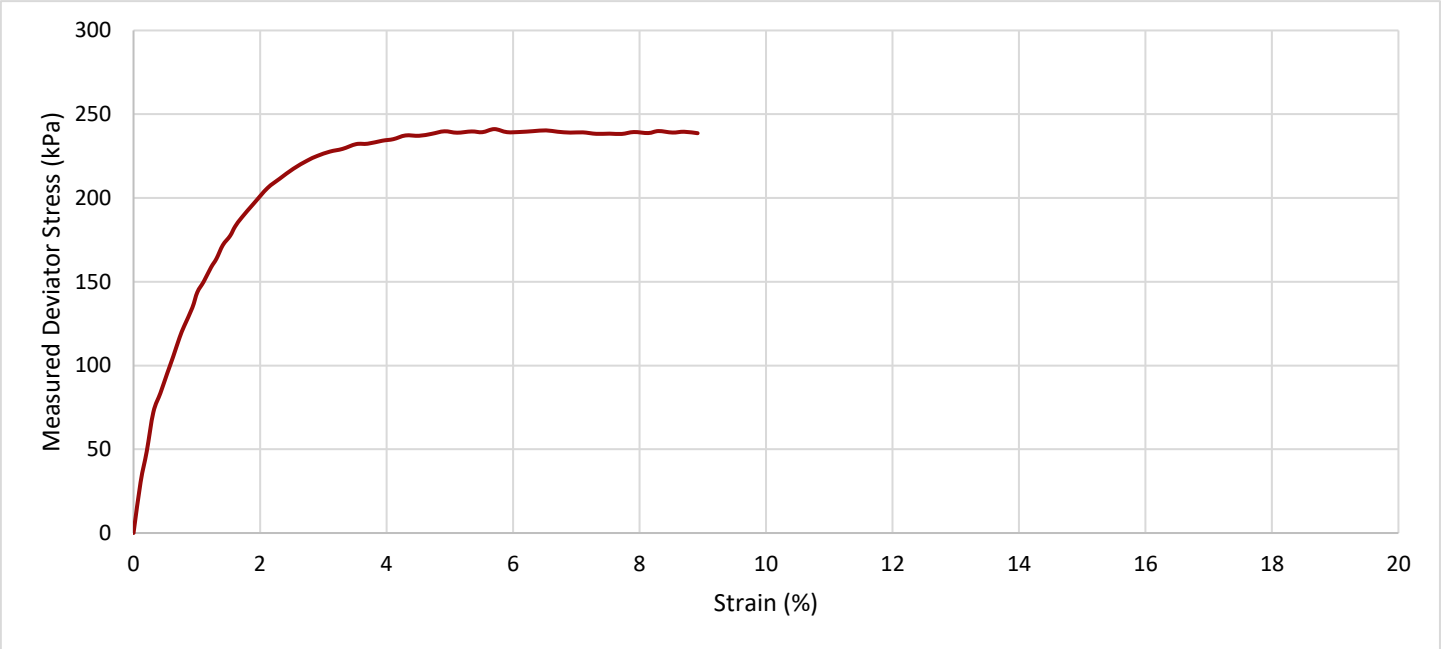
Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
CP01	10.50	U	1	Stiff (high strength) fissured dark grey CLAY	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 10.50	184.8	102.6	3074	27.1	2.01	1.58

TEST INFORMATION	Rate of Strain	1.0	% per Min	Rubber Membrane Thickness	0.3	mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	206	5.7	0.5	\	241	121		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

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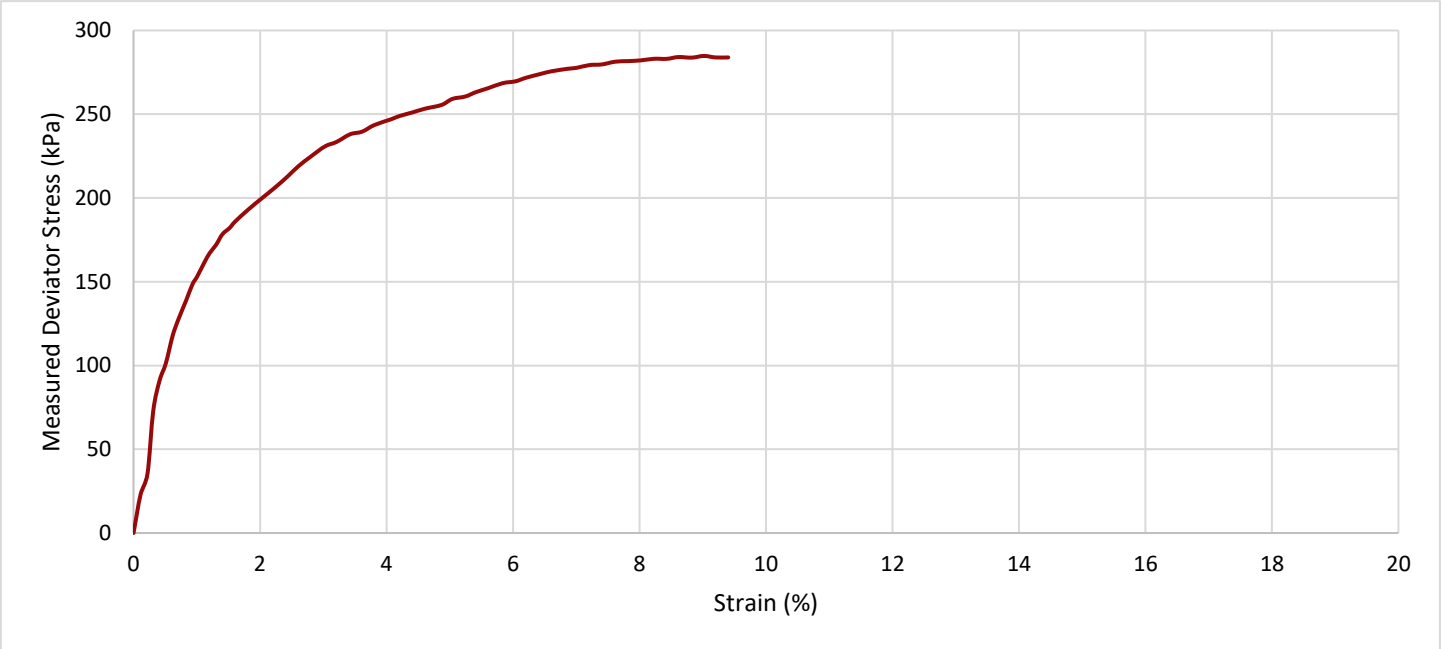
Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
CP01	14.00	U	2	Stiff (high strength) fissured dark grey CLAY	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 14.04	199.3	102.4	3256	28.8	1.98	1.54

TEST INFORMATION	Rate of Strain	1.0	% per Min	Rubber Membrane Thickness	0.3	mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	280	9.0	0.6	\	284	142		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

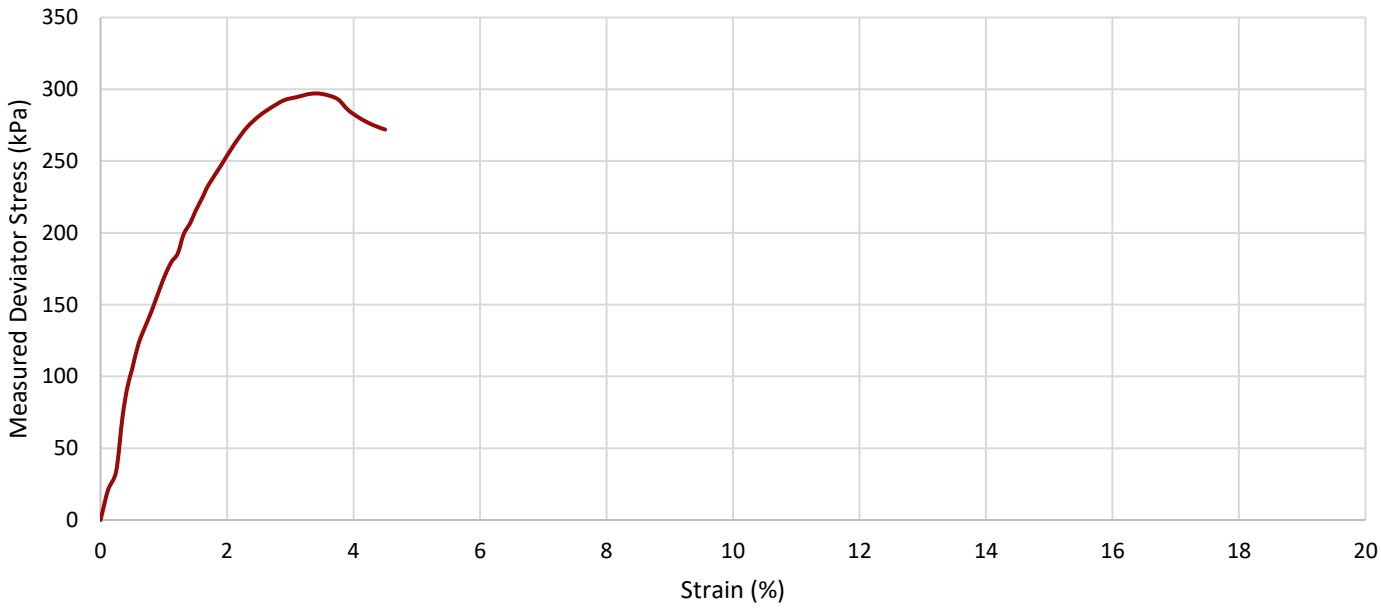
Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
CP01	17.00	U	3	Stiff (high strength) fissured dark grey CLAY	Premature failure at 3.3% strain.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 17.03	199.4	102.8	3298	29.8	1.99	1.53

TEST INFORMATION — Rate of Strain 1.0 % per Min — Rubber Membrane Thickness 0.3 mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	340	3.3	0.3	\	297	149		

Method of Preparation: BS 1377: Part 1: 1990

Method of Test: BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: Tested in Vertical Condition

UKAS Calibration - loads from 0.2 to 10kN

Remarks to Include: Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 19/07/2022

0998

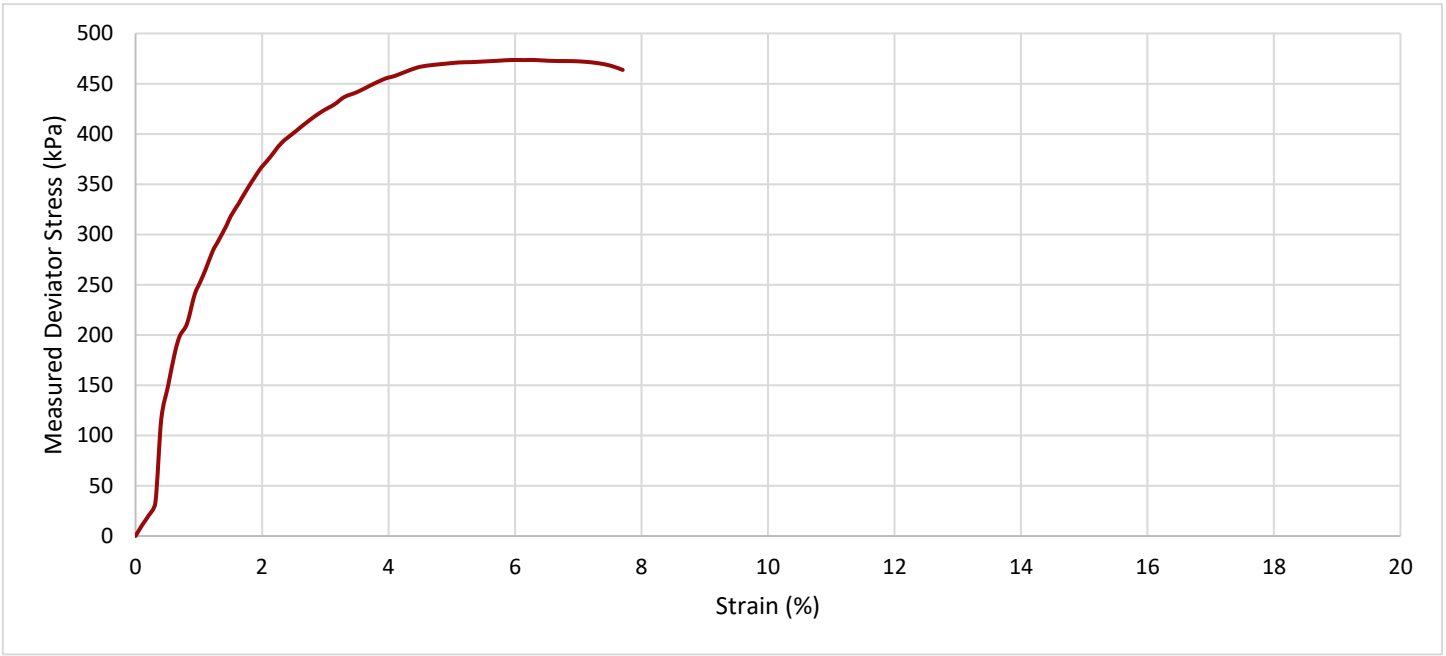
Contract	**P4301 - Sheldon House, Teddington**
Serial No.	**41057_1**

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
CP01	21.00	U	4	Very stiff (very high strength) fissured dark grey CLAY	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 21.06	199.3	102.4	3346	25.4	2.04	1.63

TEST INFORMATION — Rate of Strain 1.0 % per Min — Rubber Membrane Thickness 0.3 mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	420	6.3	0.5	\	474	237		

Method of Preparation: BS 1377: Part 1: 1990

Method of Test: BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: Tested in Vertical Condition

UKAS Calibration - loads from 0.2 to 10kN

Remarks to Include: Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

HazWasteOnline™

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.

UOERS-AVYJY-3F3FY

Job name

P4301.3

Description/Comments

Project

Sheldon House

Site

Sheldon House, Cromwell Road, Teddington, TW11 9EJ

Classified by

Name:
Simon Pike
Date:
03 Aug 2022 09:35 GMT
Telephone:
01638 663 226

Company:
AGB Environmental Ltd
341 Exning Road
Newmarket
CB8 0AT

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	17 Sep 2015
3 year Refresher overdue	-

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.30	Non Hazardous		2
2	WS02	1.00	Non Hazardous		4
3	WS03	0.30	Non Hazardous		7
4	WS04	0.50	Non Hazardous		10
5	TP01	0.20	Non Hazardous		12
6	CP01	0.30	Non Hazardous		14

Related documents

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

Report

Created by: Simon Pike

Created date: 03 Aug 2022 09:35 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	16
Appendix B: Rationale for selection of metal species	17
Appendix C: Version	17

Classification of sample: WS01

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

Sample details

Sample name:
WS01
Sample Depth:
0.30 m
Moisture content:
4.6%
(no 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: 4.6% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		13 mg/kg	1.32	17.164 mg/kg	0.00172 %		
2	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**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<**LOD**
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18 mg/kg	1.126	20.266 mg/kg	0.00203 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	77 mg/kg	1.56	120.106 mg/kg	0.0077 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<**LOD**
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14 mg/kg	2.976	41.668 mg/kg	0.00417 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<**LOD**
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		40 mg/kg	2.469	98.772 mg/kg	0.00988 %		
11	TPH (C6 to C40) petroleum group			TPH		<42 mg/kg		<42 mg/kg	<0.0042 %		<**LOD**
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<**LOD**
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<**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									
16		xylene				<2	mg/kg		<2	mg/kg	<0.0002 %		<LOD
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
17	●	pH				8.4	pH		8.4	pH	8.4 pH		
				PH									
18		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
19	●	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8									
20	●	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-469-6	83-32-9									
21	●	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
22	●	phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
23	●	anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
24	●	fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
25	●	pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
26		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
27		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
28		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
29		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
30		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
31	●	indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
32		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
33	●	benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
										Total:	0.0349 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: WS02

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

Sample details

Sample name:
WS02
Sample Depth:
1.00 m
Moisture content:
5.5%
(no 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: 5.5% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12 mg/kg	1.32	15.844 mg/kg	0.00158 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.3 mg/kg	1.142	0.343 mg/kg	0.0000343 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13 mg/kg	1.462	19 mg/kg	0.0019 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<**LOD**
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		23 mg/kg	1.126	25.895 mg/kg	0.00259 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	137 mg/kg	1.56	213.695 mg/kg	0.0137 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<**LOD**
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		11 mg/kg	2.976	32.739 mg/kg	0.00327 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<**LOD**
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		70 mg/kg	2.469	172.851 mg/kg	0.0173 %		
11	TPH (C6 to C40) petroleum group			TPH		171 mg/kg		171 mg/kg	0.0171 %		
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<**LOD**
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<**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									
16		xylene				<2	mg/kg		<2	mg/kg	<0.0002 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
17	●	pH				7.9	pH		7.9	pH	7.9 pH		
				PH									
18		naphthalene				0.12	mg/kg		0.12	mg/kg	0.000012 %		
		601-052-00-2	202-049-5	91-20-3									
19	●	acenaphthylene				1.15	mg/kg		1.15	mg/kg	0.000115 %		
			205-917-1	208-96-8									
20	●	acenaphthene				0.35	mg/kg		0.35	mg/kg	0.000035 %		
			201-469-6	83-32-9									
21	●	fluorene				1.65	mg/kg		1.65	mg/kg	0.000165 %		
			201-695-5	86-73-7									
22	●	phenanthrene				18	mg/kg		18	mg/kg	0.0018 %		
			201-581-5	85-01-8									
23	●	anthracene				4.44	mg/kg		4.44	mg/kg	0.000444 %		
			204-371-1	120-12-7									
24	●	fluoranthene				28.7	mg/kg		28.7	mg/kg	0.00287 %		
			205-912-4	206-44-0									
25	●	pyrene				25.1	mg/kg		25.1	mg/kg	0.00251 %		
			204-927-3	129-00-0									
26		benzo[a]anthracene				13.3	mg/kg		13.3	mg/kg	0.00133 %		
		601-033-00-9	200-280-6	56-55-3									
27		chrysene				11	mg/kg		11	mg/kg	0.0011 %		
		601-048-00-0	205-923-4	218-01-9									
28		benzo[b]fluoranthene				11.5	mg/kg		11.5	mg/kg	0.00115 %		
		601-034-00-4	205-911-9	205-99-2									
29		benzo[k]fluoranthene				4.24	mg/kg		4.24	mg/kg	0.000424 %		
		601-036-00-5	205-916-6	207-08-9									
30		benzo[a]pyrene; benzo[def]chrysene				12.6	mg/kg		12.6	mg/kg	0.00126 %		
		601-032-00-3	200-028-5	50-32-8									
31	●	indeno[123-cd]pyrene				7.38	mg/kg		7.38	mg/kg	0.000738 %		
			205-893-2	193-39-5									
32		dibenz[a,h]anthracene				2.07	mg/kg		2.07	mg/kg	0.000207 %		
		601-041-00-2	200-181-8	53-70-3									
33	●	benzo[ghi]perylene				6.37	mg/kg		6.37	mg/kg	0.000637 %		
			205-883-8	191-24-2									
										Total:	0.0752 %		

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
ND	Not detected
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 because Soil matrix no free phase product

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0171%)

Classification of sample: WS03

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

Sample details

Sample name:
WS03
Sample Depth:
0.30 m
Moisture content:
6.4%
(no 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: 6.4% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		26 mg/kg	1.32	34.328 mg/kg	0.00343 %		
2	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5 mg/kg	1.142	0.571 mg/kg	0.0000571 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		63 mg/kg	1.126	70.931 mg/kg	0.00709 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	635 mg/kg	1.56	990.483 mg/kg	0.0635 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		16 mg/kg	2.976	47.62 mg/kg	0.00476 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<LOD
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		589 mg/kg	2.469	1454.416 mg/kg	0.145 %		
11	TPH (C6 to C40) petroleum group			TPH		42 mg/kg		42 mg/kg	0.0042 %		
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<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									
16		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<**LOD**
17	●	pH		PH		6.7	pH		6.7	pH	6.7 pH		
18		naphthalene 601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19	●	acenaphthylene	205-917-1	208-96-8		0.2	mg/kg		0.2	mg/kg	0.00002 %		
20	●	acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21	●	fluorene	201-695-5	86-73-7		0.12	mg/kg		0.12	mg/kg	0.000012 %		
22	●	phenanthrene	201-581-5	85-01-8		2.39	mg/kg		2.39	mg/kg	0.000239 %		
23	●	anthracene	204-371-1	120-12-7		0.48	mg/kg		0.48	mg/kg	0.000048 %		
24	●	fluoranthene	205-912-4	206-44-0		6.38	mg/kg		6.38	mg/kg	0.000638 %		
25	●	pyrene	204-927-3	129-00-0		6.04	mg/kg		6.04	mg/kg	0.000604 %		
26		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		3.63	mg/kg		3.63	mg/kg	0.000363 %		
27		chrysene 601-048-00-0	205-923-4	218-01-9		2.37	mg/kg		2.37	mg/kg	0.000237 %		
28		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		3.28	mg/kg		3.28	mg/kg	0.000328 %		
29		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		1.1	mg/kg		1.1	mg/kg	0.00011 %		
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		3.3	mg/kg		3.3	mg/kg	0.00033 %		
31	●	indeno[123-cd]pyrene	205-893-2	193-39-5		2	mg/kg		2	mg/kg	0.0002 %		
32		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		0.44	mg/kg		0.44	mg/kg	0.000044 %		
33	●	benzo[ghi]perylene	205-883-8	191-24-2		1.71	mg/kg		1.71	mg/kg	0.000171 %		
										Total:	0.237 %		

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
ND	Not detected
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 because Soil matrix no free phase product

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0042%)

Classification of sample: WS04

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

Sample details

Sample name:
WS04
Sample Depth:
0.50 m
Moisture content:
4.9%
(no 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: 4.9% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9 mg/kg	1.32	11.883 mg/kg	0.00119 %		
2	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
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15 mg/kg	1.462	21.923 mg/kg	0.00219 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		7 mg/kg	1.126	7.881 mg/kg	0.000788 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	16 mg/kg	1.56	24.957 mg/kg	0.0016 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		11 mg/kg	2.976	32.739 mg/kg	0.00327 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<LOD
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		40 mg/kg	2.469	98.772 mg/kg	0.00988 %		
11	TPH (C6 to C40) petroleum group			TPH		<42 mg/kg		<42 mg/kg	<0.0042 %		<LOD
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<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									
16		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<**LOD**
17	●	pH		PH		7.6	pH		7.6	pH	7.6 pH		
18		naphthalene 601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19	●	acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20	●	acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21	●	fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22	●	phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23	●	anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24	●	fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25	●	pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		chrysene 601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31	●	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
33	●	benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
										Total:	0.0263 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP01

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

Sample details

Sample name:
TP01
Sample Depth:
0.20 m
Moisture content:
4.9%
(no 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: 4.9% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11 mg/kg	1.32	14.524 mg/kg	0.00145 %		
2	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 %		
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	23.385 mg/kg	0.00234 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<LOD
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		25 mg/kg	1.126	28.147 mg/kg	0.00281 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	214 mg/kg	1.56	333.8 mg/kg	0.0214 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<LOD
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		12 mg/kg	2.976	35.715 mg/kg	0.00357 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<LOD
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		106 mg/kg	2.469	261.745 mg/kg	0.0262 %		
11	TPH (C6 to C40) petroleum group			TPH		<42 mg/kg		<42 mg/kg	<0.0042 %		<LOD
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<LOD
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<LOD
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<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									
16		xylene				<2	mg/kg		<2	mg/kg	<0.0002 %		<**LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
17	●	pH				8	pH		8	pH	8pH		
				PH									
18		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
19	●	acenaphthylene				0.11	mg/kg		0.11	mg/kg	0.000011 %		
			205-917-1	208-96-8									
20	●	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
21	●	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
22	●	phenanthrene				1.25	mg/kg		1.25	mg/kg	0.000125 %		
			201-581-5	85-01-8									
23	●	anthracene				0.26	mg/kg		0.26	mg/kg	0.000026 %		
			204-371-1	120-12-7									
24	●	fluoranthene				3.23	mg/kg		3.23	mg/kg	0.000323 %		
			205-912-4	206-44-0									
25	●	pyrene				2.86	mg/kg		2.86	mg/kg	0.000286 %		
			204-927-3	129-00-0									
26		benzo[a]anthracene				1.67	mg/kg		1.67	mg/kg	0.000167 %		
		601-033-00-9	200-280-6	56-55-3									
27		chrysene				1.37	mg/kg		1.37	mg/kg	0.000137 %		
		601-048-00-0	205-923-4	218-01-9									
28		benzo[b]fluoranthene				1.7	mg/kg		1.7	mg/kg	0.00017 %		
		601-034-00-4	205-911-9	205-99-2									
29		benzo[k]fluoranthene				0.52	mg/kg		0.52	mg/kg	0.000052 %		
		601-036-00-5	205-916-6	207-08-9									
30		benzo[a]pyrene; benzo[def]chrysene				1.6	mg/kg		1.6	mg/kg	0.00016 %		
		601-032-00-3	200-028-5	50-32-8									
31	●	indeno[123-cd]pyrene				1.04	mg/kg		1.04	mg/kg	0.000104 %		
			205-893-2	193-39-5									
32		dibenz[a,h]anthracene				0.28	mg/kg		0.28	mg/kg	0.000028 %		
		601-041-00-2	200-181-8	53-70-3									
33	●	benzo[ghi]perylene				0.93	mg/kg		0.93	mg/kg	0.000093 %		
			205-883-8	191-24-2									
										Total:	0.0666 %		

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
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: CP01

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

Sample details

Sample name:
CP01
Sample Depth:
0.30 m
Moisture content:
8.9%
(no 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: 8.9% No 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	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		11 mg/kg	1.32	14.524 mg/kg	0.00145 %		
2	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**
3	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	27.77 mg/kg	0.00278 %		
4	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				<2 mg/kg	2.27	<4.54 mg/kg	<0.000454 %		<**LOD**
5	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		36 mg/kg	1.126	40.532 mg/kg	0.00405 %		
6	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	241 mg/kg	1.56	375.915 mg/kg	0.0241 %		
7	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<1 mg/kg	1.353	<1.353 mg/kg	<0.000135 %		<**LOD**
8	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		13 mg/kg	2.976	38.691 mg/kg	0.00387 %		
9	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<3 mg/kg	2.554	<7.662 mg/kg	<0.000766 %		<**LOD**
10	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		121 mg/kg	2.469	298.785 mg/kg	0.0299 %		
11	TPH (C6 to C40) petroleum group			TPH		<42 mg/kg		<42 mg/kg	<0.0042 %		<**LOD**
12	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
13	benzene	601-020-00-8	200-753-7	71-43-2		<2 mg/kg		<2 mg/kg	<0.0002 %		<**LOD**
14	toluene	601-021-00-3	203-625-9	108-88-3		<5 mg/kg		<5 mg/kg	<0.0005 %		<**LOD**
15	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<2 mg/kg		<2 mg/kg	<0.0002 %		<**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									
16		xylene 601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2	mg/kg		<2	mg/kg	<0.0002 %		<**LOD**
17	●	pH		PH		9.7	pH		9.7	pH	9.7 pH		
18		naphthalene 601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19	●	acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20	●	acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21	●	fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22	●	phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23	●	anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24	●	fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25	●	pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[a]anthracene 601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		chrysene 601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[b]fluoranthene 601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		benzo[k]fluoranthene 601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		benzo[a]pyrene; benzo[def]chrysene 601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31	●	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		dibenz[a,h]anthracene 601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
33	●	benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
										Total:	0.0735 %		

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
ND	Not detected
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

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **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

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)

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)

mercury {mercury dichloride}

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 sulphate}

Insufficient chromium for Zinc Chromate

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.192.5237.9831 (11 Jul 2022)
HazWasteOnline Database: 2022.192.5237.9831 (11 Jul 2022)

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

Appendix 5 CSM Risk Evaluation Methodology

Classification of Consequence

The classifications of consequence (severity) are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). agb Environmental has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance.

Classification	Definition
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health unlikely to lead to "significant harm". Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structure and services.

Classification of Probability

The classifications of probability are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). agb Environmental has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance. Also, in the Part 2A Statutory Guidance "pollutant linkage" is now termed "contaminant linkage", although it is noted that the terms are effectively synonymous.

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

Categorisation of Risk

		Consequence (Severity)			
		Severe	**Medium**	**Mild**	**Minor**
Probability (Likelihood)	**High Likelihood**	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Description of Risk Levels and Likely Action Required

Term	Description
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action or there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action. Realisation of the risk is likely to present a substantial liability to the site owner or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate risk	It is possible that without appropriate remediation action, harm would arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from identified hazard. It is likely that, at worst, if any harm was realised any effects would be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very low risk	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

Summary of Definitions

Term	Description
Hazard	A property or situation which in certain circumstances could lead to harm. (The properties of different hazards must be assessed in relation to their potential to affect the various different receptors).
Consequences	The adverse effects (or harm) arising from a defined hazard which impairs the quality of the environment or human health in the short or longer term.
Probability	The mathematical expression of the chance of a particular event in a given period of time (e.g. probability of 0.2 is equivalent to 20% or a 1 in 5 chance).
Likelihood	Probability; the state of face of being likely.
Risk	A combination of the probability or frequency of the occurrences of a defined hazard AND the magnitude of the consequences of that occurrence.
Contaminant linkage	An identified pathway is capable of exposing a receptor to a contaminant and that contaminant is capable of harming the receptor. In the Part 2A Statutory Guidance the terms “contaminant”, “pollutant” and “substance” have the same meaning, and some non-statutory technical guidance relevant to land contamination uses alternative terms such as “pollutant”, “substance” and associated terms in effect to mean the same thing.

Appendix D

Asset location search

Property Searches

Ardent Consulting Engineers
Hallmark Building
Leadenhall Street
LONDON
EC3M 5JE

Search address supplied

1
Sheldon House
Cromwell Road
Teddington
TW11 9EJ

Your reference Sheldon House

Our reference ALS/ALS Standard/2022_4727673

Search date 3 October 2022

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Asset location search

Property Searches

Search address supplied: 1, Sheldon House, Cromwell Road, Teddington, TW11 9EJ

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 searchprovides 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

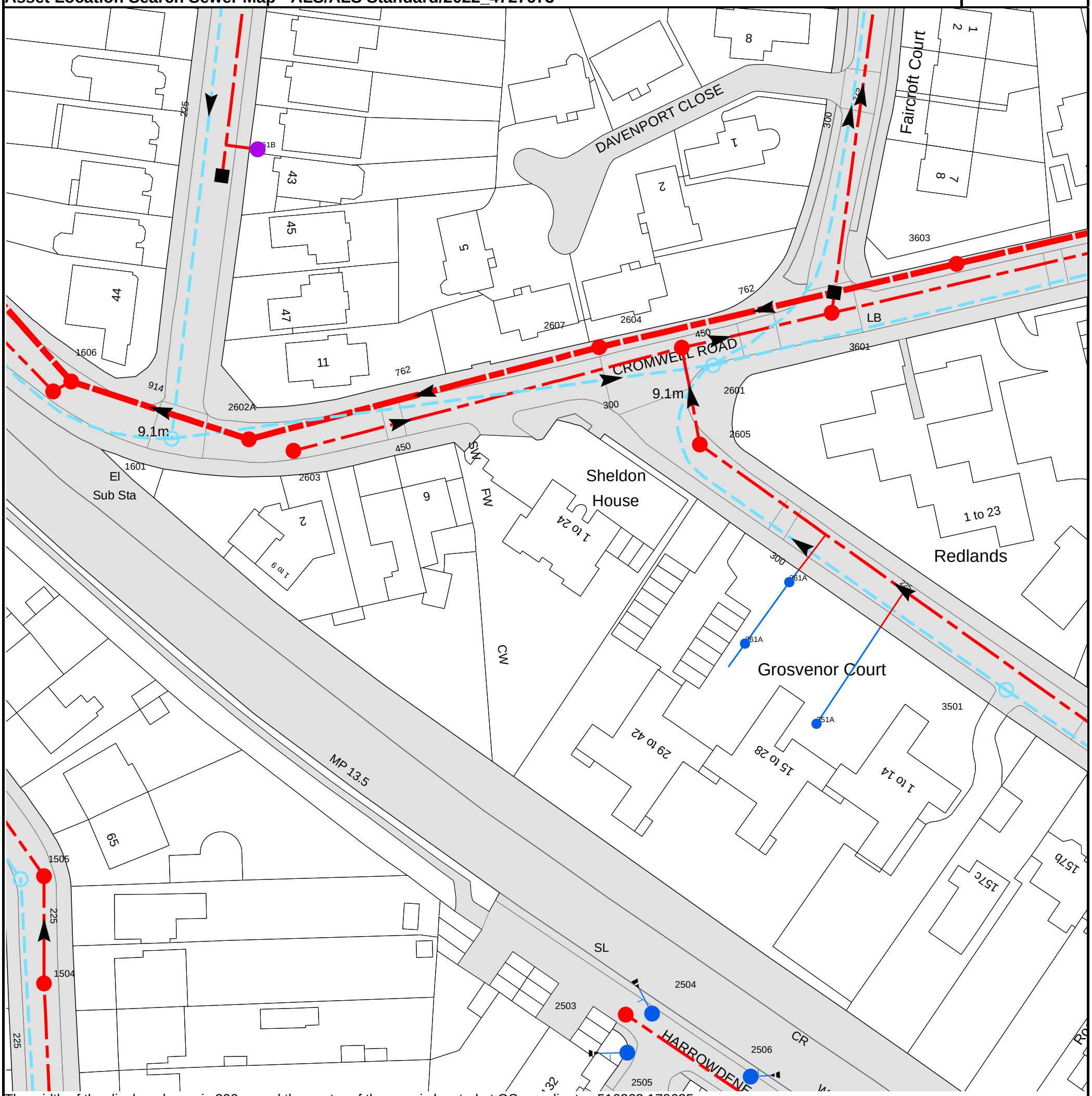
Clean Water queries

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/2022_4727673



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 516263,170625

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
261B	n/a	n/a
2506	n/a	n/a
351A	n/a	n/a
3501	9.12	6.18
261A	n/a	n/a
361A	n/a	n/a
2601	9.1	6.07
3601	9.21	6.34
3603	9.19	-2.2
2505	n/a	n/a
2503	n/a	n/a
2504	n/a	n/a
2603	8.96	6.65
2605	9.01	6.62
2602A	9.03	-2.39
1601	9.06	6.9
1603	8.9	n/a
1606	8.99	-2.49
2604	9.05	6.41
2607	8.92	-2.3
1504	9.02	6.19
1501	8.99	7.56
1505	9.07	6.08

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.

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

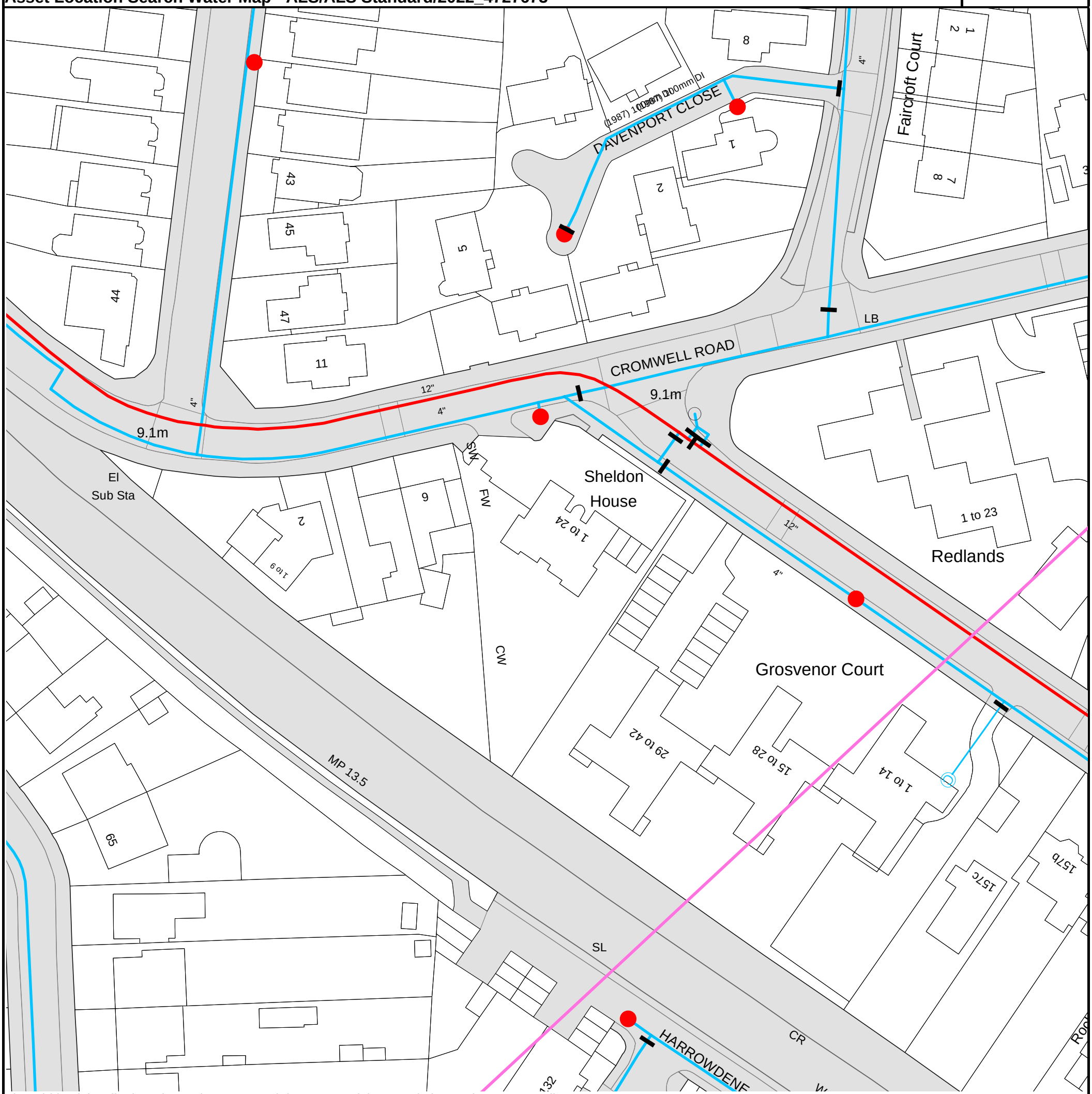
Ducts may contain high voltage cables. Please check with Thames Water.

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/2022_4727673



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 516263, 170625.

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.

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

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

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.

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

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

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.

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')

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.

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.

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 14 days from due 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. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. 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'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. 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 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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 0121 345 1000 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**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	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	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

Sewer Flooding
History Enquiry

Property Searches

Ardent Consulting Engineers

Leadenhall Street

Search address supplied	1 Sheldon House Cromwell Road Teddington TW11 9EJ
Your reference	Sheldon House
Our reference	SFH/SFH Standard/2022_4727676
Received date	**3 October 2022**
Search date	**3 October 2022**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: 1,Sheldon House,Cromwell Road,Teddington,TW11 9EJ

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Appendix E

KEY

- SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER & CATCHPIT
- PROPOSED SURFACE WATER SEWER & MANHOLE
- EXISTING THAMES WATER SURFACE WATER SEWER
- EXISTING THAMES WATER FOUL WATER SEWER
- PROPOSED FOUL WATER SEWER & MANHOLE
- PROPOSED GEO-CELLULAR ATTENUATION TANK
- PROPOSED PERMEABLE PAVEMENT
- PROPOSED GREEN ROOF
- EXCEEDENCE FLOW ROUTES

PROPOSED CONNECTION TO EXISTING THAMES WATER FOUL WATER SEWER IL 6.52

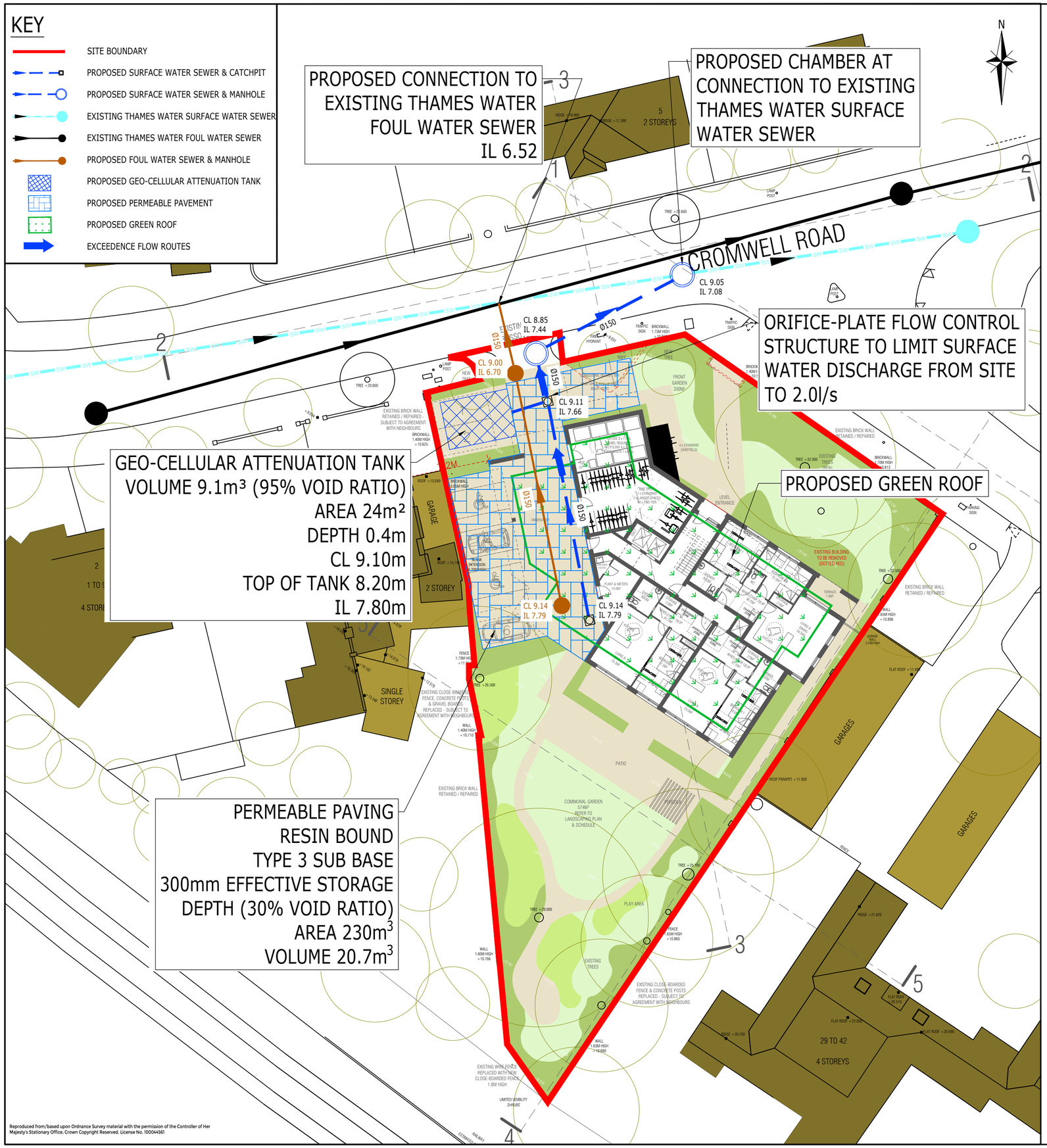
PROPOSED CHAMBER AT CONNECTION TO EXISTING THAMES WATER SURFACE WATER SEWER

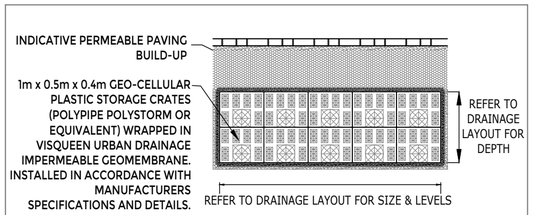
ORIFICE-PLATE FLOW CONTROL STRUCTURE TO LIMIT SURFACE WATER DISCHARGE FROM SITE TO 2.0l/s

GEO-CELLULAR ATTENUATION TANK
VOLUME 9.1m³ (95% VOID RATIO)
AREA 24m²
DEPTH 0.4m
CL 9.10m
TOP OF TANK 8.20m
IL 7.80m

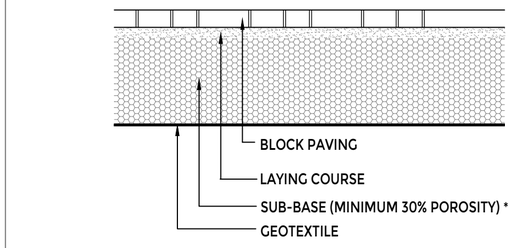
PROPOSED GREEN ROOF

PERMEABLE PAVING
RESIN BOUND
TYPE 3 SUB BASE
300mm EFFECTIVE STORAGE
DEPTH (30% VOID RATIO)
AREA 230m³
VOLUME 20.7m³

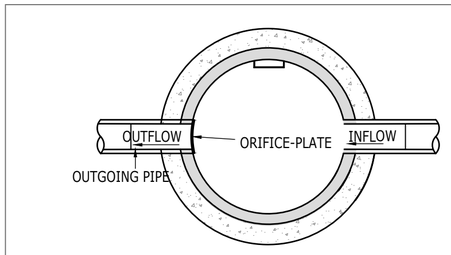




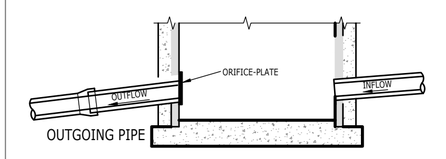
CELLULAR ATTENUATION TANK CONSTRUCTION DETAILS
(NOT TO SCALE)



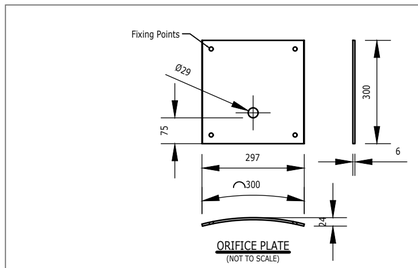
CONSTRUCTION SPECIFICATION FOR LIGHTER DUTY PERMEABLE BLOCK PAVED AREAS
(NOT TO SCALE)



PLAN ON FLOW CONTROL MANHOLE
(NOT TO SCALE)



SECTION THROUGH FLOW CONTROL MANHOLE
(NOT TO SCALE)



ORIFICE PLATE
(NOT TO SCALE)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES, UNLESS OTHERWISE STATED. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.
4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS.
5. NO DEVIATION FROM THE DETAILS SHOWN ON THIS DRAWING IS PERMITTED WITHOUT PRIOR PERMISSION FROM THE ENGINEER.
6. EXISTING DRAINAGE AND UTILITIES TO BE CONFIRMED IN-SITU BY THE CONTRACTOR, PRIOR TO STARTING WORKS.
7. THE DRAINAGE STRATEGY IS INDICATIVE ONLY, TO DEMONSTRATE DESIGN INTENT AND ATTENUATION STORAGE REQUIREMENTS.
8. INDICATIVE DRAINAGE STRATEGY SUBJECT TO THAMES WATER AND THE LONDON BOROUGH OF RICHMOND UPON THAMES (LEAD LOCAL FLOOD AUTHORITY) APPROVAL.

NOT FOR CONSTRUCTION

Rev	Description	Drn	Chk	App	Date
A	UPDATE TO DEVELOPMENT PLANS	TR	CC	BC	20.12.22

ARDENT CONSULTING ENGINEERS
Third Floor
The Hallmark Building
52-56 Leadenhall Street
London
EC3M 5JE
Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client
RHP DEVELOP LTD

Project Title:
SHELDON HOUSE, TEDDINGTON

Drawing Title:
FOUL AND SURFACE WATER DRAINAGE STRATEGY

A2 Scale	Date	Designed by
1:250	10/10/2022	TR
Drawn by	Checked by	Approved by
TR	CC	BC

Drawing Number: 2200650-001
Rev: A

CATCHMENT KEY

- ROAD = 150m2
- ROOF = 190m2
- GREEN-ROOF = 345m2

CROMWELL ROAD

CROSSING

EXISTING CROSSOVER

REDLANDS

FAIRFAX ROAD

GROSVENOR COURT

GARAGE

GARAGES

SINGLE STORY

2 STOREY

3 STOREYS

4 STOREYS

1 TO 9

1 TO 23

2 STOREYS

5 2 STOREYS

6 2 STOREYS

29 TO 42

4 STOREYS

15 TO 28

4 STOREYS

1 TO 14

FRONT GARDEN 330M²

COMMUNAL GARDEN 574M² REFER TO LANDSCAPING PLAN & SCHEDULE

PATIO

PLAY AREA

EXISTING TREES

EXISTING BUILDING TO BE REMOVED (OUTLED RED)

LEVEL ENTRANCE

EXISTING BRICK WALL RETAINED / REPAIRED

EXISTING BRICK WALL RETAINED / REPAIRED - SUBJECT TO AGREEMENT WITH NEIGHBOURS

EXISTING CLOSE-BOARDED FENCE, CONCRETE POSTS & GRAVEL BOARDS REPLACED - SUBJECT TO AGREEMENT WITH NEIGHBOURS

EXISTING CLOSE-BOARDED FENCE & CONCRETE POSTS REPLACED - SUBJECT TO AGREEMENT WITH NEIGHBOURS

EXISTING WIRE FENCE REPLACED WITH NEW CLOSE-BOARDED FENCE, 1.8M HIGH

NEW TREE

TREE = 22.600

TREE = 20.600

TREE = 26.500

TREE = 29.000

TREE = 25.100

TREE = 32.000

TREE = 22.500

LAMP POST

TRAFFIC SIGN

FIRE HYDRANT

BT CABINET

PARKING SIGN

OCCASIONAL DELIVERY BAY

DROP-OFF & PICK-UP ONLY BUS 10AM - 4PM

4 x STANDARD (HAYFIELD)

LIMITED VISIBILITY SPLAYS

RAILWAY EMBANKMENT

2M

7.0M

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user name: theo risley

N

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES, UNLESS OTHERWISE STATED. ALL LEVELS SHOWN ARE IN METRES ABOVE ORDNANCE DATUM.

NOT FOR CONSTRUCTION

Rev	Description	Drn	Chk	App	Date
A	UPDATE TO DEVELOPMENT PLANS	TR	CC	BC	15/12/22

ARDENT CONSULTING ENGINEERS

Third Floor
The Hallmark Building
52-56 Leadenhall Street
London
EC3M 5JE

Tel: 020 7680 4088
Web: www.ardent-ce.co.uk
E-mail: enquiries@ardent-ce.co.uk

Client

RHP DEVELOP LTD

Project Title:

SHELDON HOUSE, TEDDINGTON

Drawing Title:

SURFACE WATER DRAINAGE CATCHMENT PLAN

A2 Scale	Date	Designed by
1:250	10/10/2022	TR
Drawn by	**Checked by**	**Approved by**
TR	CC	BC

Drawing Number: 2200650-002 Rev A

File Location: z:\ardent projects\2200650 - sheldon house, teddington\technical\acad\drawings\2200650-002a surface water drainage catchment plan.dwg

Appendix F

Print | Close Report

HR Wallingford
Working with water

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Theo Risley
Site name:	Sheldon House
Site location:	Teddington

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.42282° N
Longitude:	0.32913° W
Reference:	1994907515
Date:	Oct 10 2022 15:17

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.111

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics	Default	Edited
SAAR (mm):	600	600
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.17	0.17
1 in 1 year (l/s):	0.14	0.14
1 in 30 years (l/s):	0.39	0.39
1 in 100 year (l/s):	0.54	0.54
1 in 200 years (l/s):	0.63	0.63

Appendix G

PRELIMINARY DRAINAGE CALCULATIONS

15/12/2022

EXISTING SURFACE WATER

Existing site information:

Site Boundary Area	1650	m2
Developable Area	0.165	ha
Impermeable Area	0.111	ha

Modified Rational Method Equation: $Q_n = 2.78\ CiA$

where:

C *Runoff Coeffic* = 1 (in this case 1 as using impermeable area)

i_n *Rainfall Intensity for n return period (mm/hr)*

A *Impermeable Area (Ha)*

Q_n *Runoff for n return period (l/s)*

Rainfall Intensity:

The rainfall intensities for various return periods were extracted from Table 1(a) of the Transport and Road Research Laboratory Report - Estimated rainfall for drainage calculations in the United Kingdom (TRRL Report LR 595) by C. P. Young. For the 5 min duration.

i_1	50.8	mm/hr
i_{30}	113.02	mm/hr
i_{100}	143.9	mm/hr

Existing Surface Water Runoff:

Therefore:

			C		i_n		A		Q_n	
Q_1	2.78	x	1	x	50.8	x	0.111	=	**15.68**	**l/s**
Q_{30}	2.78	x	1	x	113.0	x	0.111	=	**34.88**	**l/s**
Q_{100}	2.78	x	1	x	143.9	x	0.111	=	**44.40**	**l/s**

PRELIMINARY DRAINAGE CALCULATIONS

15/12/2022

PROPOSED SURFACE WATER

Discharge rate 2 l/s

Impermeable Area 0.069 ha including no uplift for urban Creep

Quick Storage Estimate
Lower 26 m3
Upper 38 m3
Average 32 m3

		Cellular Tanks		Permeable Paving		Total Storage Volume
Catchment	Total Impermeable area (ha)	Area Alloc (m2)	Storage vo (m3)	Area Alloc (m2)	Storage volume Offered (m3)	
Area 1	0.069	24	9.12	230	20.7	29.82
		400mm depth at 95%		300mm deep storage membrane at 30% void ratio		
Total	0.069	24	9.12	230	20.7	29.82

Appendix H

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	40
Ratio R	0.427	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	300	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.044	4-8	0.017

Total Area Contributing (ha) = 0.061

Total Pipe Volume (m³) = 0.696

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	19.308	0.130	148.5	0.053	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	5.780	0.228	25.4	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	14.304	0.360	39.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	90.95	5.39	7.790	0.053	0.0	0.0	5.2	0.82	14.5«	18.2
1.001	90.59	5.44	7.668	0.061	0.0	0.0	6.0	2.01	35.5	21.1
1.002	89.50	5.59	7.440	0.061	0.0	0.0	6.0	1.60	28.3	21.1

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		9.050	7.080	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	5	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.427		

Online Controls for Storm

Orifice Manhole: 4, DS/PN: 1.001, Volume (m³): 2.0

Diameter (m) 0.029 Discharge Coefficient 0.600 Invert Level (m) 7.668

Storage Structures for Storm

Porous Car Park Manhole: 3, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	63.9	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	8.840	Membrane Depth (mm)	0

Tank or Pond Manhole: 4, DS/PN: 1.001

Invert Level (m) 7.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	24.0	0.400	24.0	0.401	0.0

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.427
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	3	120 Winter	100	+40%	100/15 Summer				9.000
1.001	4	120 Winter	100	+40%	100/15 Summer				9.004
1.002	5	120 Winter	100	+40%					7.467

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	3	1.060	0.000	0.61		60	8.3	FLOOD RISK	
1.001	4	1.186	0.000	0.07			2.0	FLOOD RISK	
1.002	5	-0.123	0.000	0.08			2.0	OK	

Appendix I

1.0 INTRODUCTION

1.1 The development at Sheldon House includes a number of Sustainable Drainage Systems (SuDS) as part of the surface water drainage system including green roofs, permeable paving and geocellular tanks. This Technical Note sets out an outline management plan for the aforementioned SuDS components.

1.2 The proposed SuDS components in addition to addressing climate change will bring a number of benefits in terms of water quality, environmental, and social amenity.

1.3 The maintenance of all SuDS components will be in accord with the best practices and CIRIA document C753 "The SuDS Manual". Typical maintenance activities for the proposed SuDS components have been reproduced from Table 32.1 of "The SuDS Manual" in **Table 1** below. A private management company will be set up to maintain the surface water drainage network, including on-site SuDS. .

Table 1: Typical SuDS Maintenance Activities

Operation and maintenance activity	SuDS component		
	Geo-cellular Tank	Permeable paving	Green roof
Regular maintenance			
Inspection	■	■	■
Litter and debris removal	□	■	■
Grass cutting			■
Weed and invasive plant control		□	■
Shrub management		□	
Shoreline vegetation			
Aquatic vegetation management			
Occasional maintenance			
Sediment management	■	■	
Vegetation replacement			■
Vacuum sweeping and brushing		■	
Remedial maintenance			
Structure rehabilitation / repair	□	□	□
■ will be required □ may be required			

2.0 SuDS MANAGEMENT PLAN

2.1 This plan is intended to cover all on-site drainage structures. The Site Management Team should oversee and implement the SuDS Management Plan and designate a qualified person who will be responsible for the proper operation and maintenance of the surface water drainage structures.

Water Quality Management

2.2 In line with Tables 26.2 and 26.3 of the CIRIA C753 The SuDS Manual, it can be seen that the proposed greenroofs and permeable paving would provide sufficient treatment for the surface water runoff from the Site.

2.3 The surface drainage network would also be designed to protect and enhance the quality of surface water runoff through the removal of sediment and pollutants. Catchpit manholes and silt trapped gullies will reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal, prohibitions on the use of pesticides, and maintenance of bin areas.

Maintenance Program

2.4 The Site Management Team will conduct the SuDS Management Plan set forth in this document. The Site Management will ensure that inspections and record keeping are timely and accurate. Inspection & Maintenance Log Forms should include the date and physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. Records of maintenance will be kept on file on-site and copies of Inspection & Maintenance Log sheets indicating all work and inspections will be available to the Council upon request. A model Maintenance log in appended for reference.

2.5 Regular maintenance should include:

- Inspect channel and gully inlet grates and remove any debris every 6 months or as determined to be reasonable based on experience with the installed

systems to ensure that the gullies are working in their intended fashion and that they are free of debris;

- Inspect gully sumps and bottom of drain manholes quarterly; if depth of sediment in sumps exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.

- All litter shall be picked up and removed from the parking areas, external bin store, wetland areas, green roofs, and soft landscaping.

- Inspect all green roofs. Replant bare areas or areas with sparse growth.

- Inspect external bin stores for spillage and scattered litter must be performed on a regular basis to prevent the spread of pollutants into the surface water drainage network.

- Green roofs will require regular inspection and maintenance on a weekly or fortnightly basis, especially during the establishment stage (first 12 – 15 months). Maintenance during the establishment stage should be made the responsibility of the green roof provider, to ensure healthy growth and satisfactory establishment. Regular inspections of the green roof area should also include the soil substrate for the presence of erosion and drainage inlets to ensure run-off can discharge unrestricted.

- The inlets, outlet and vents and overflows of SuDS components should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.

Winter Maintenance Program

2.6 Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months.

Operation and Maintenance requirements

2.7 Recommendations for the operation and maintenance including typical frequencies are included in **Tables 2, 3** and **4** below.

Table 2: SuDS Operation and Maintenance Requirements- Green Roofs

SUDS Element	**Green Roofs**	
Maintenance Period	**Maintenance Task**	**Frequency**
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	6 monthly and annually, or as required
	During establishment (i.e. year one) replace dead plants	Monthly
	Post establishment, replace dead plants as required (where >5% coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Work	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required.
	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources or erosion damage should be identified and controlled	As required.

Monitoring	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability.	Annually and after severe storms.
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources.	Annually and after severe storms.
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system.	Annually and after severe storms.
	Inspect underside of roof for evidence of leakage.	Annually and after severe storms.

Table 3: SuDS Operation and Maintenance Requirements- Permeable paving

SUDS Element	**Permeable Paving**	
Maintenance Period	**Maintenance Task**	**Frequency**
Regular Maintenance	Brushing and vacuuming	Once a year or as required
Occasional Maintenance	Stabilise and mow contributing adjacent area	As required
	Removal of weed or management using glyphospate applied directly into weeds by an applicator rather than spraying	As required
Remedial Work	Remediate any landscaping which has been raised to within 50mm of the level of the paving	As required.
	Remedial work to any depressions, rutting and cracked or broken	As required.

	blocks considered detrimental to structural performance or a hazard to users.	
Monitoring	Rehabilitation of surface or upper structure by remedial sweeping	Every 10 to 15 years, or as required
	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	3 monthly, 48hrs after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 4: SuDS Operation and Maintenance Requirements- Attenuation tank

SUDS Element	**Attenuation Tank**	
Maintenance Period	**Maintenance Task**	**Frequency**
Maintenance Work	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial Work	Repair/rehabilitate inlets, outlets, overflows and vents	As required.

Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually.
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.

Suds Management Plan- Appendix A

Drainage Operation and Maintenance Log

Site Maintenance Supervisor:_____ Date:_____

☐ Routine ☐ Response to rainfall event _ in ☐ Other:_____

BMP	Frequency	Date Performed	Comments
Gullies and Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Pavement Areas (parking, driveways, service areas)	Quarterly Sweeping		
	Rubbish & Litter Removal as Necessary		
Green Roofs	Annual inspection		
Green Roofs Geocellular attenuation (permavoid)	Bi-annual maintenance as necessary		
	Inspect and identify areas not operating property every 3 months (for the first 3 months) and every 6 months after		
Geocellular attenuation (permavoid)	Full bi-annual inspection		

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	**Low**	**0.5**	**0.4**	**0.4**
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

Table 1: Pollution hazard indices for different land use classifications

(land use in bold applicable for the development).

	Mitigation indices		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio retention system	0.8	0.8	0.8
Permeable pavement	**0.7**	**0.6**	**0.7**
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	**These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.**		

Table 2: Indicative SuDS mitigation indices for discharges to surface waters

(bold text is applicable to this development).

For surface water discharge from Residential Parking Areas and Low Traffic Roads <300 traffic movements/day			
	Required mitigation indices		
Source	**TSS**	**Metals**	**Hydrocarbons**
Low	**0.5**	**0.4**	**0.4**
Type of SuDS component provided			
Permeable pavement	0.7	0.6	0.7
Total	**0.7**	**0.6**	**0.7**
Check	**+0.20**	**+0.20**	**+0.3**

Table 3: SuDS mitigation indices provided

Appendix J

Theo Risley

Ardent Consulting Engineers
The Hallmark Building (Third Floor)
52-56 Leadenhall Street
London
EC3M 5JE

Wastewater pre-planning
Our ref DS6100696

30 November 2022

Pre-planning enquiry: Confirmation of sufficient capacity

Site Address: Sheldon House, Cromwell Road, Teddington, TW11 9EJ

Dear Theo,

Thank you for providing information on your development.

Proposed site: 34 residential units, proposed foul water connection by gravity into a foul water sewer 450mm in dia in Cromwell Road. Proposed surface water connection into a surface water sewer 225mm in dia in Cromwell Road at total 2l/s.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

When developing a site, policy 5.13 of the London Plan and Policy 3.4 of the Supplementary Planning Guidance (Sustainable Design And Construction) states that every attempt should be made to use flow attenuation and SuDS/Storage to reduce the surface water discharge from the site as much as possible.

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you

have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
2) rainwater infiltration to ground at or close to source
3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
4) rainwater discharge direct to a watercourse (unless not appropriate)
5) controlled rainwater discharge to a surface water sewer or drain
6) controlled rainwater discharge to a combined sewer.

Where connection to the public sewerage network is required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

If the above surface water hierarchy has been followed and if the flows are restricted to a total of 2 l/s then Thames Water would not have any objections to the proposal.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 07747 641932

Yours sincerely

Natalya Collins
Developer Services – Adoptions Engineer
Mobile: 07747 641 932
Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk
Get advice on making your sewer connection correctly at connectright.org.uk

Appendix K

PRELIMINARY DRAINAGE CALCULATIONS

15/12/2022

EXISTING FOUL WATER

ARDENT
CONSULTING ENGINEERS

Unit Type	Existing Area/Units		Hours (hrs)	Foul Water Flow Rate l/day			Peak Factor	Peaked Loading l/s			Loading (l/s)
General Housing p	24	units	24	600	per	property	6.6	0.0458333	per	property	1.100

TOTAL EXISTING FOUL LOADING = 1.100

PROPOSED FOUL WATER

Unit Type	Proposed Area/Units		Hours (hrs)	Foul Water Flow Rate l/day			Peak Factor	Peaked Loading l/s			Loading (l/s)
General Housing p	27	units	24	600	per	property	6.6	0.0458333	per	property	1.238

TOTAL PROPOSED FOUL LOADING = 1.238