By the early-1930s, residential properties had been constructed approximately 50m to the northeast of the site, to the immediate north of the bowling green, as well as residential properties to the southeast (e.g. Fitzroy Farm Cottage, more lately the 'Water House'). The 'miniature rifle range' was no longer present by this time.

By the early-1950s, a pavilion for the bowling green had been constructed to the immediate north of the site, and an unspecified 'tank' was present 80m east of the site in the grounds of Fitzroy Farm Cottage.

By the early-1990s, some redevelopment of private residences appears to have taken place to the immediate northeast of the site (e.g. Farm End Cottage) and the southeast of the site (e.g. The Water House). No further significant changes appear to have occurred in the site vicinity to the present day.

4. GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

4.1 Geology

4.1.1 General Characteristics

The published 1:50,000 scale geological map (Sheet No. 256 'North London') and 1:10,560 scale geological map (TQ28NE) of the area indicate that the immediate site area is underlain by the London Clay Formation (**Figure 3**).

The London Clay Formation is divided by the British Geological Survey (BGS) into five informal units. The lowest four, denoted A to D, are not mapped, whereas the top part of the formation is mapped as the Claygate Member. The site lies on the flank of, and topographically below, a dissected outlier comprising the Claygate Member and the overlying Bagshot Formation. These latter strata form the high ground on which Hampstead and Highgate are located, and comprise sandy lithologies, which give rise to the sandy soils of the heathlands. The geological boundary between the Claygate Member and the underlying Unit D of the London Clay Formation is shown to lie approximately 20m to the northeast of the site (**Figure 3**). It is therefore considered that the site area lies within Unit D of the London Clay Formation.

The BGS define the Claygate Member as "all the deposits above the base of the lowest fine-grained sandy bed that are thick enough to be distinguished from the underlying relatively homogenous clays". However, it notes in this regard that the criteria are "difficult to maintain in the mapping of outliers of Claygate Member in central London and westwards from there because of the increasing number of sand beds in the underlying Unit D of the London Clay".

In the west of the (London) district, the Claygate Member is described as a finely interbedded and thinly laminated sequence of clay, silt and fine-grained sand with numerous interbeds of planar and lenticular bedded fine-grained, finely laminated sand. The Hampstead Heath borehole (TQ28NE/198, **Appendix A**), reported by the BGS, indicates that the Claygate Member is dominated by mainly very fine-grained sand and silt in this area, whilst the underlying London Clay comprises silt, clay and silty clay. According to the BGS Memoir for London, beds of clayey silt grading to silty fine-grained sand increase in number and thickness within the London Clay across the London district from east to west. Unit D of the London Clay Formation is described as comprising interbedded sandy clayey silt to sandy silt, although silt and sand dominated beds may make up less than 10% of the succession. However, the Hampstead Heath borehole (TQ28NE/198) indicates that Unit D is dominated by silt, clay and silty clay in this area.

An intrusive site investigation was formerly undertaken at the Fitzroy Farm site by Fugro Engineering Services Limited, details of which are provided within Ove Arups' report, dated April 2007. No borehole logs were included within the report, but the ground conditions are described as 1.2m to 2.0m thickness of Made Ground, of predominantly clay lithology, overlying the London Clay Formation, which is described as firm to very stiff fissured clay with rare sand partings and lenses, with the clay slightly sandy at some levels.

No superficial deposits are shown in the site area, but the 1:50,000 scale geological map indicates that the site lies within an area of 'Head propensity', which is based on the geotechnical properties of the London Clay. These areas are most likely to be covered by Quaternary Head deposits as interpreted from digital slope analysis and confirmed by borehole data. These are not mapped deposits and not verified by fieldwork.

4.1.2 Slope Stability Issues

The 1:50,000 scale geological map for the area indicates that the site lies within an 'Area of Significant Landslide Potential'.

The BGS' assessment of the potential for slope stability is given as follows:

"Due to a long history of intensive land use and urban development it has only been possible to recognise and map, with confidence, a few areas of past landslide activity. However, beyond the North London District, areas of similar bedrock geology and topography contain significant areas of mapped landslides. Therefore, a slope instability assessment has been made to act as a guide to where areas of significant landslide potential are present, but obscured, and where further information regarding their stability are needed before development or major changes in land use are made.

The assessment used a deterministic approach that looks at the presence at a site of landslide causative factors, such as slope angle, lithology and groundwater conditions that increase the susceptibility of a site to landslide activity. The causative factors were weighted according to their relative importance in promoting landslides and combined in a Geographical Information System to produce a computer generated map of the relative susceptibility to landslide activity across the area. It does not necessarily mean that landslides have happened in the past or will do so in the future but if conditions change through natural or artificial means and a causative factor increases, then slope instability may be triggered."

The site reconnaissance survey did not reveal any obvious significant issues associated with the stability of slopes on the site. Under the proposed development plan (see **Section 10.3**), slope stability issues are unlikely to affect the proposed residential structure, although it may need to be taken into consideration with regard to any landscaping proposals. It is, therefore, considered that further assessment of slope stability issues may need to be undertaken in light of the BGS assessment.

4.1.3 Radon

The environmental database report indicates that the site is not located within an 'Affected Area' as defined by the Documents of the National Radiological Protection Board (Radon Atlas of England and Wales, NRPB-W26-2002). Therefore the risk of significant ingress of radon into structures on-site is considered to be low and no radon protective measures are required within new dwellings at the site.

4.2 Hydrogeology

4.2.1 General Characteristics

The London Clay Formation (excluding the Claygate Member) is classified by the Environment Agency as a Non-aquifer (**Section 4.2.2**), reflecting its inability to store and transmit significant quantities of groundwater. Values for the coefficient of permeability for the London Clay Formation range from 3×10^{-9} m/s for clay with sand partings and silty clay to 3×10^{-11} m/s for intact clay, indicating the very low permeability of these materials.

During the previous site investigation undertaken by Fugro, no groundwater inflows of any significance were encountered during the drilling works, although a water level could be measured within the borehole standpipes after some days. The water levels in the standpipes continued rising for several days after completion of drilling, which, according to Ove Arup, was indicative of very low rates of water seepage and very low permeability in the surrounding ground.

In contrast, a perched water table may be present within the sandier lithologies of the overlying Claygate Member and Bagshot Formation, both of which are classified by the Environment Agency as Minor Aquifers of variable permeability. Although no such features have been identified or reported from the subject site or its immediate environs, springs / seepages / issues are known from the wider vicinity. These features are associated with geological boundaries between units of contrasting permeability, namely the junction between the Bagshot Formation and Claygate Member, and the Claygate Member and underlying argillaceous London Clay. A spring-fed drinking fountain, the Goodison Fountain, is located approximately 200m northwest of the site and is associated with the Claygate Member/London Clay boundary. The subject site is located topographically below, and hence down-gradient from, these spring lines, and is underlain by very low permeability London Clay. It is therefore considered likely that any subsurface groundwater flow will be restricted to any Made Ground or possible reworked London Clay at shallow depth.

It is also possible that perched water may be present in any Made Ground on site. With regard to this latter issue, buried plastic drainage pipes at the junction between the Made Ground and underlying London Clay were noted at the site by Ove Arup; these pipes could potentially be land drains.

4.2.2 Vulnerability of Groundwater Resources

The London Clay Formation is classified by the Environment Agency (EA) as a Non-aquifer (as indicated on the Environment Agency Groundwater Vulnerability Map of the area, Sheet No.39 '*West London*').

The London Clay acts as an aquiclude, restricting the downwards migration of shallow groundwater (and mobile contaminants, if present) to deeper groundwater resources in the Thanet Sands / Lambeth Group (Minor Aquifers) and the Chalk Group (a Major Aquifer).

However, the presence of low permeability clay at relatively shallow depths beneath the site, whilst restricting downwards migration, may increase the potential for lateral migration of shallow groundwater (and therefore mobile contamination, if present).

4.2.3 Licensed Groundwater Abstraction

The environmental database report indicates that there are no current licensed groundwater abstractions and no public water supply boreholes within a 1km radius of the site.

The Environmental Health Department of the London Borough of Camden has reported that they are unable to provide records of private water supplies. However, they confirm that there are a number of known groundwater abstraction boreholes, recorded by the BGS, within 2km of the site, which appear to be historical (1833 – 1900), with the exception of one record for the Royal Free Hospital, Hampstead, dated 1999. The depths given relate to the abstraction of groundwater from the Chalk aquifer and overlying Thanet Sand Formation / Lambeth Group aquifers, which underlie the London Clay Formation.

In terms of aquifer protection, the EA generally adopts a three-fold classification of Source Protection Zones for public supply abstraction wells.

- *Zone I* - or 'Inner Protection Zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source.

- *Zone II* - or 'Outer Protection Zone' is defined by a 400-day travel time to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants.

- *Zone III* - or 'Total Catchment' is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole.

Information available on the EA website indicates that the site does not lie within a currently designated groundwater Source Protection Zone.

4.3 Hydrology

The subject site lies within the catchment of the stream formerly known as the Highgate Brook, forming one of the tributaries of the River Fleet, which drains to the River Thames near Blackfriars. The Fleet rises on Hampstead Heath by two heads, separated by Parliament Hill. The eastern, or Highgate, source lies near to the subject site, and is fed via a series of springs in the grounds of Kenwood House, whence the stream flows southwards, via the Highgate Ponds (**Figure 3**). It is understood that this series of ponds was excavated in the 17th and 18th centuries for water supply purposes. The ponds currently serve a variety of leisure and recreational purposes, and are the subject of a number of conservation and management measures under the Corporation of London's Hampstead Heath Management Plan.

The ponds are formed in the channel of the Highgate Brook, which flows over impermeable London Clay. Flow in the stream is likely to be derived from direct surface runoff, and by drainage of groundwater from springs as noted above (Section 2.2).

A surface watercourse is present immediately adjacent to the site's northwestern boundary, and is clearly identified by the topography and geological outcrop pattern shown on the 1:10,560 geological map (**Figure 3**). This watercourse is orientated northeast to southwest, and flows in a southwesterly direction, discharging into the northern end of the Ladies Bathing Pond.

A second surface watercourse, located approximately 80m to the southeast of the site, is also indicated by topography and geological outcrop pattern (**Figure 3**). This watercourse, which is also orientated northeast to southwest, appears to be partly culverted / buried, and apparently discharges into the Wildfowl Reserve Pond, which lies to the southeast of (downstream from) the Ladies Bathing Pond.

4.3.1 Preliminary Flood Risk Assessment

The indicative floodplain map for the area, published by the EA, shows that the site does not lies within any designated fluvial floodplains.

4.4 Mining, Quarrying and Landfilling

Evidence has been sought to identify any mining, quarrying and landfilling operations, past and present which have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- Environmental database report;
- Records held by Local Authority / Environment Agency;
- Old Ordnance Survey maps and plans (see **Section 3**); and
- Geological maps (see **Section 4.1**).

With reference to the above data there are no recorded mines, quarries or landfills within a 1km radius of the site, although 'brick fields' are known from the wider area. However, with

regard to fill, and with reference to the historical data, there has clearly been at least one phase of construction and demolition on the site and therefore the presence of Made Ground should not be overlooked.

5. PRELIMINARY CONCEPTUAL SITE MODEL

5.1 Introduction

A CSM is a simplified written and/or visual/schematic description of the environmental conditions on a site and the surrounding area. It is developed from the individual components of the investigation at each stage to provide a depiction of likely contaminants, pathways and receptors, and highlights key areas of uncertainty.

Fundamental to the CSM is the principle of pollutant linkages, i.e. a source of contamination, a migration pathway and a receptor at risk from that contamination must all be present for a pollutant linkage to be complete. This approach is now accepted best practice in the industry but it does not take into account less scientific factors such as perceived risk, which frequently has a significant influence on land values.

The site is considered for the proposed future end use, which is understood to be a residential development with private gardens.

The preliminary CSM presented below is based on the findings of the Preliminary (Phase 1) investigation and information from previous intrusive investigations and therefore contains elements of conjecture and hypothesis. The exploratory investigation reported upon herein was designed to test those hypotheses and acquire data on the actual ground conditions beneath the site, enabling the CSM to be further refined.

In the following sections, the individual components of all identified possible pollutant linkages are assessed using the information identified during the course of the Preliminary (Phase 1) investigation described above.

5.2 Sources of Contamination

The study has identified no direct evidence of potentially contaminative land uses on or in the vicinity of the site. However, at least one phase of demolition and construction has taken place on the site, which could have resulted in unknown Made Ground being present, with potential contaminants as identified in **Table 5.1**.

Table 5.1 – Potential Sources and Types of Contamination

Potential Sources	Contaminants of Concern
On-site	
Made Ground (i.e. fill material).	Unknown fill material (but potentially including heavy metals, ash, clinker, sulfates, polycyclic aromatic hydrocarbons (PAHs), asbestos etc.).

5.3 Receptors at Risk

The risk assessment identifies potential receptors within the following four categories:

i. end users of the site who may have acute exposure to sources of contamination on a regular and predictable basis;

ii. controlled waters, being defined as all surface water, groundwater or perched water;

iii. building structures and services placed in or on the ground;

iv. other targets such as the "environment", including any flora and fauna on or near the site and construction and maintenance workers who will have chronic but potentially higher levels of exposure than end users.

Table 5.2 below lists the main sensitive targets within these categories as follows:

Table 5.2 – Receptors at Risk

Category	Details of receptor
Current/End users	As detailed within the CLEA Model, this comprises a 0-6 year old female child with respect to the proposed residential end use.
Controlled waters	From the desk study/walkover information these comprise the water features of Highgate Ponds and associated surface drainage lines.
Buildings/services	Buried concrete and other material within the ground, including water supply pipes etc.
Other targets	Short term occupation by construction workers and long term but intermittent visits by maintenance workers. Vegetation may be present in the form of planting within private gardens.

5.4 Pathways for Migration

Based on the proposed end use of the site and the anticipated ground conditions at and in the vicinity of the site, the contaminant pathways identified within **Table 5.3** are considered potentially to be present.

Table 5.3 – Pathways for Migration

Category	Details of pathway
End users	Pathways relevant to the end user are identified in the CLEA Model as ingestion, inhalation of soil / dust particulates or contaminant vapours, dermal contact (absorption through skin), and consumption of garden vegetables and fruit.
Controlled waters	The presence of low permeability clay beneath the site, whilst restricting downwards migration, may increase the potential for migration of surface / perched water, and therefore mobile contamination, if present.
Buildings/services	Buried concrete and services will be susceptible to attack via contact with aggressive/contaminated ground, especially if mobile groundwater is present.
Other targets	Pathways towards construction and maintenance workers will relate to acute exposure and as such are outside the scope of chronic risk assessment methodologies. Vegetation and other ecological targets may be affected by contact with contaminated soils via plant uptake routes.

5.5 Preliminary CSM

Based on the assumptions above, a preliminary CSM of pollutant linkages on the site has been developed from the above information and is presented as **Table 5.4**, which combines and summarises the information contained within **Table 5.1** to **5.3**. The CSM includes a qualitative estimation of risk for each pollutant linkage, based on a comparison of the

consequence of the event against the probability of its occurrence, in line with the risk classification methodology presented in CIRIA Report C552 (2001).

Table 5.4 – Preliminary Conceptual Model of Pollutant Linkages

Sources Potentially Present	Pathways	Receptors	Qualitative Assessment of Risk
Made Ground across site (may include heavy metals, PAH, sulphate, asbestos, etc.)	Ingestion of contaminated soil, dust, liquid Inhalation of contaminated dust and vapours/gases Contact with contaminated ground/liquid Migration via surface runoff / perched water flow	Human health (current and future site users) Human health (construction workers) Building materials Controlled waters Third Party land	**LOW** - Made Ground encountered by previous site investigation, although no direct evidence of contamination identified. No history of potentially contaminative land use.

To summarise, although the preliminary CSM has identified no direct evidence of ground contamination on the site, unknown Made Ground may be present and possible pathways for contamination to migrate and sensitive receptors potentially at risk have been identified. Possible pollutant linkages are therefore deemed to exist.

6. GROUND INVESTIGATION

6.1 Site Work

6.1.1 Rationale

The purpose of the intrusive investigation was to aid the confirmation of the ground conditions at the site with regard to the hydrogeological assessment, and to obtain geotechnical parameters for design purposes. With regard to contamination and environmental issues, the investigation was also designed to test the potential pollutant linkages identified within the Preliminary CSM. The techniques adopted for the investigation have been chosen considering the anticipated ground conditions and the proposed development.

6.1.2 Scope of Works

The intrusive site work was carried out by RSK between 20th and 23rd April 2010, and comprised the activities summarised in **Table 6.1**, below. The investigation and the soil descriptions were carried out in general accordance with BS5930:1999 - Code of Practice for Site Investigations. The exploratory hole logs are presented in **Appendix B**.

Table 6.1 – Summary of Ground Investigation Activities

Investigation Type	Number	Designation	Rationale
Boreholes - by light cable percussive methods	3	BH1 to BH3	To prove the geological succession beneath the site, obtain geotechnical data and install standpipe piezometers
Boreholes – by drive-in-sampler	12	WS1 to WS12	To accurately log the upper 5m of strata and install monitoring standpipes
Standpipe/Piezometer installations	9	BH1 to BH3, WS2, WS3, WS7, WS10 to WS12	Groundwater monitoring installations
Trial Pits - excavated by hand	5	TP1 to TP5	To obtain information on current foundation configurations
Water level monitoring in piezometer/monitoring well installations	-	BH1 to BH3, WS2, WS3, WS7, WS10 to WS12	Measurement of depth to groundwater and establish groundwater conditions

The investigation points were located approximately by reference to physical features present on the site at the time of investigation. An exploratory hole location plan is shown in **Figure 2**. The ground levels at the borehole locations have been determined by rigorous surveying techniques.

A photographic record of the retrieved drive-in sampler soil cores between 1.0m and 5.0m bgl is provided in **Appendix B**.

6.2 Laboratory Testing

6.2.1 Introduction

A programme of geotechnical and chemical laboratory testing, scheduled by RSK and as detailed below, was carried out on selected samples taken from various strata. The laboratory results are presented in **Appendices C** and **D**, respectively.

6.2.2 Geotechnical Testing

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in **Table 6.2**. Where appropriate, testing was undertaken in accordance with BS 1377:1990 Method of Tests for Soils for Civil Engineering Purposes within RSK's UKAS accredited laboratory.

Tests carried out in order to classify the concrete class required on site have been undertaken following the procedures within BRE SD1:2005 by a UKAS accredited laboratory (Envirolab).

Table 6.2 – Summary of Geotechnical Testing Programme

Strata	Tests undertaken	No of Tests
London Clay Formation	pH and sulfate	7
	Plasticity Index	13
	Natural Moisture Content	33
	Triaxial Compression	14
	Particle Size Distribution and Hydrometer Analysis	2
	Compaction Testing	2

6.2.3 Chemical Testing

The programme of chemical tests was undertaken on samples obtained from the intrusive investigation as presented in **Table 6.3**. The scope of the testing undertaken is based on the findings of the Phase 1 study discussed above and includes the Contaminants of Concern listed within the Preliminary CSM in **Section 5.2**.

The testing was carried out to assess the levels of contamination within the Made Ground encountered on the site with regard to identified receptors as detailed within the Conceptual Model. Testing was undertaken by a UKAS accredited laboratory (Envirolab). MCERTS accredited test methods were specified where applicable.

Table 6.3 Summary of Chemical Testing Programme

Strata	Tests undertaken	No of Tests	Rationale
Made Ground	Metals Suite: As, Cd, tCr, Pb, Hg, Se, wsB, Cu, Ni, Zn, pH	5	**Non-Targeted** (representative Made Ground)
	Total Petroleum Hydrocarbons	5	**Non-Targeted** (representative Made Ground)
	Speciated Polyaromatic Hydrocarbons	5	**Non-Targeted** (representative Made Ground)
	Asbestos Screen	5	**Non-Targeted** (representative Made Ground)

7. PHYSICAL GROUND CONDITIONS

7.1 Findings of Ground Investigation

7.1.1 General Succession of Strata

The exploratory holes revealed that the site is underlain by a variable thickness of Made Ground and Topsoil over weathered London Clay Formation, becoming unweathered with depth, and with a localised occurrence of alluvium in the northwest of the site. For the purpose of discussion, the ground conditions are summarised in **Table 7.1** below.

Table 7.1 – General Succession of Strata Encountered

Strata	Exploratory Holes Encountered	Depth to top of stratum m.bgl (mAOD)	Thickness (m)
Made Ground/ Topsoil	All	GL (81.45 – 84.39)	0.1 – 1.7
Alluvium	WS10, WS11 and WS12	1.0 – 1.7 (79.75 – 80.69)	0.7 – 2.8
Weathered London Clay Formation	All	0.1 – 3.8 (83.54 – 77.89)	0.5+ - 6.2
London Clay Formation	BH1 to BH3	5.8 – 6.7 (77.39 – 75.94)	3.3+ - 14.2+

+ Thickness penetrated without proving full thickness of stratum

7.1.2 Made Ground / Topsoil

The exploratory holes encountered a variable thickness of Made Ground across the site, ranging from 0.1m to 1.7m thick, although in general the Made Ground was 0.3m to 0.9m thick. The thinnest Made Ground was encountered in BH2, where weathered London Clay was found to lie directly beneath a concrete capping layer. The thickest area of Made Ground was encountered in the northwest of the site, in the area of the tennis court and adjacent sloped informal gardens, and ranged between 1.0m and 1.7m in thickness.

In general, the Made Ground comprised brown, locally friable, very silty / clayey slightly gravelly sand or sandy slightly gravelly reworked clay with roots. The gravel fraction generally comprised flint, with fragments of brick and concrete and occasional fragments of clay tile, glass, slate, wood, charcoal and coal/clinker-type material and occasional cobbles of brick and concrete. The Topsoil generally comprised dark-brown slightly sandy slightly gravelly clay with roots.

Despite lying in an area of 'Head propensity', no deposits were encountered that could unambiguously be described as 'Head', although elements of the Made Ground (e.g. reworked sandy slightly gravelly clay) could represent reworked or disturbed Head deposits.

In the northwest of the site, in WS10, WS11 and WS12, fine-grained alluvial sediments (see **Section 3.2.3** below) contained occasional fine fragments of brick and pottery / clay tile. Locally, in WS12, abraded fragments of glazed clay-pipe, pottery and metal were encountered at 1.9m bgl. The presence of these man-made materials may possibly indicate disturbed or slightly reworked alluvial materials in this area.

No visual or olfactory evidence of contamination was encountered within the Made Ground or Topsoil.

7.1.3 Alluvium

Fine-grained alluvial sediments, not shown on the geological map for the area, were encountered in WS10, WS11 and WS12, adjacent to the site's northwestern boundary. This area of the site lies close to the watercourse previously identified (see **Section 2.3**), which runs past the site boundary in this area. These sediments appear to be restricted to the valley (previously identified by topography and geological outcrop pattern, **Section 2.3**) of this watercourse. The area of informal gardens in the northwest of the site decreases in elevation from approximately 84mAOD at its eastern corner, to 82mAOD at the southwestern boundary, and 81.5mAOD at the site's northwestern boundary, the topography defining the eastern part of this small valley system.

The alluvium was encountered beneath a layer of Made Ground, which, in the western corner of the site (WS10) was 1.7m thick, decreasing in thickness northeastwards to 1.0m thick in WS11 and WS12. This may indicate that the site has been raised and levelled in this area to form the current tennis court.

In general, the alluvium comprised soft and wet, becoming firm, black and grey mottled black organic silt, greeny-grey slightly sandy slightly gravelly silt, and localised brown sandy slightly gravelly clay, with root traces / plant fragments and occasional fine flint gravel. As noted above, the sporadic presence of man-made materials within the upper parts of the Alluvium may possibly indicate disturbed or slightly reworked alluvial materials in this area.

In WS10 and WS12, immediately adjacent to the site's northwestern boundary, the base of the alluvium lay at approximately 77.9mAOD. In WS11, to the southeast of WS10 and WS12, a thinner sequence of alluvium was encountered, its base apparently lying at an elevation of approximately 79.9mAOD, indicating that these alluvial sediments rapidly thin and 'wedge-out' eastwards against the underlying weathered London Clay.

No visual or olfactory evidence of contamination was encountered within the Alluvium.

7.1.4 Weathered London Clay Formation

The London Clay Formation was encountered across the site beneath the Made Ground and Alluvium. The upper part of the London Clay, encountered at depths ranging between 0.1m and 3.8m bgl, was deeply weathered, this horizon extending to depths of 5.8m to 6.7m bgl (77.39 - 75.94mAOD). All of the drive-in sampler boreholes terminated within this weathered horizon at 5m bgl, and only the three cable-percussive boreholes proved the presence of unweathered London Clay at depth.

In general, the weathered London Clay comprised firm, becoming stiff, locally soft in its uppermost part, fissured brown mottled grey-green, and locally orangey-brown, silty clay. The clay was also occasionally slightly sandy (fine sand) in places. Roots, rootlets and root traces were common. Selenite crystals were abundant, occurring throughout as fine to coarse sand-sized aggregates and large single crystals up to 2cm long. Powdery iron oxide and carbonate precipitate and discrete carbonate nodules were also locally present. Also sporadically present were generally widely spaced thin laminae of fine sand, with yellow and orange iron oxide staining.

Particle size distribution analyses between 1.0m and 3.0m bgl confirm that this material is a slightly sandy (4 – 5%) silty (42 – 48%) clay (48 – 51%) of very high plasticity (**Appendix C**).

No visual or olfactory evidence of contamination was encountered within the weathered London Clay.