

# Kneller Hall School

Twickenham

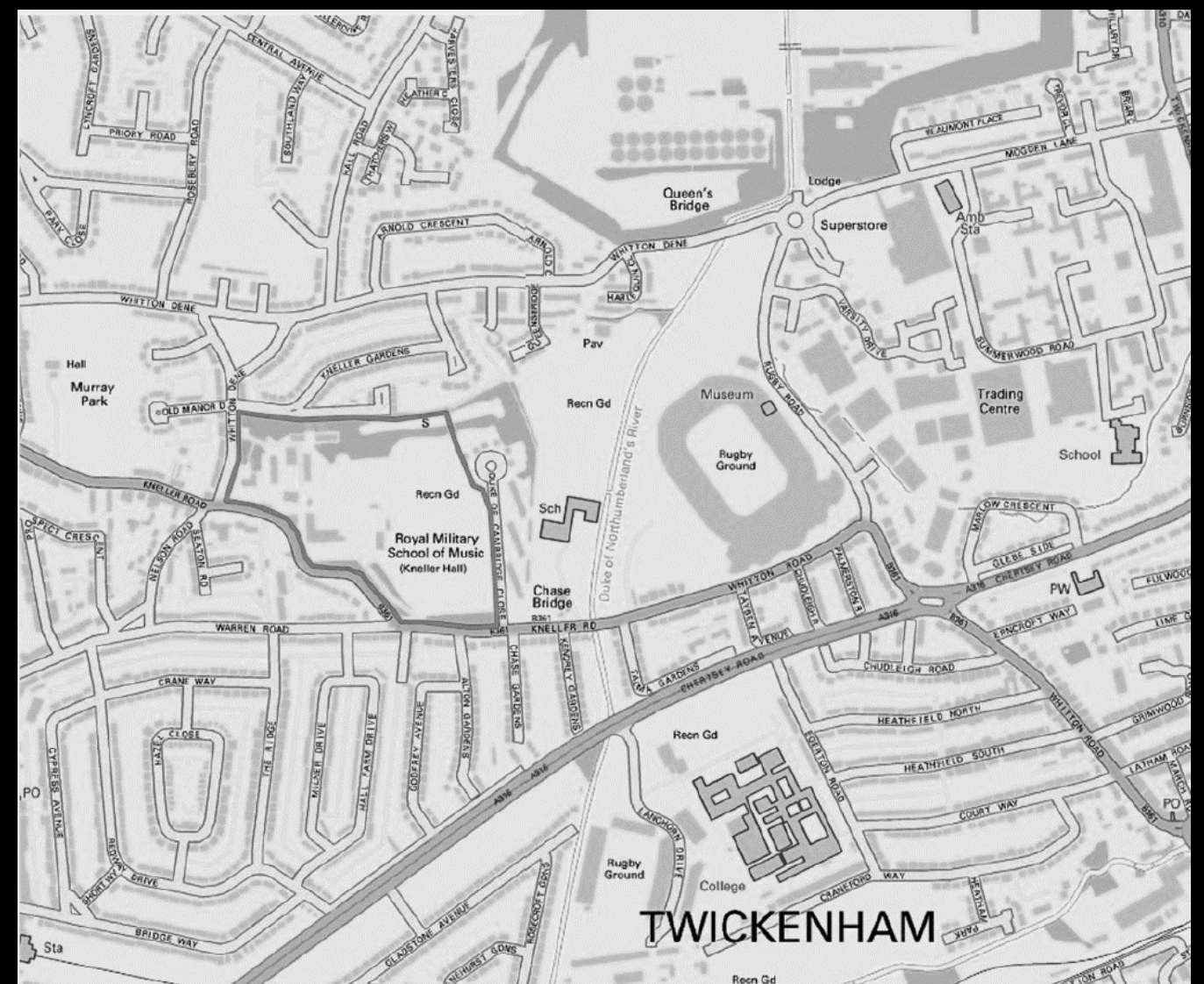
Dukes Education

Basement Impact Assessment  
STRUCTURAL / CIVIL ENGINEERING

L221004-AKSW-05-XX-RP-S-0011

23/09/2022

Revision	Description	By	Checked/Approved	Date
P01	First Issue	AJS/AA/GK	AJS	22/09/2022
P02	Drawing References Amended	AJS	AJS	23/09/2022



## 1.0 Introduction

- 1.1 AKS Ward was instructed by Dukes Education to provide a Basement Impact Assessment report in support of the planning application for the Kneller Hall site, Twickenham.
- 1.2 The purpose of this report is to discuss any proposed basements within the development and assess any potential impact of these on neighbouring properties, listed buildings, groundwater and flooding potential. The Basement Screening Assessment questions have been used as the basis for the scope of the assessment – please refer to section 10 for the summary screening assessment.
- 1.3 The site was previously used by the MoD as the Royal Military School of Music and it is proposed to re-develop the site for usage as an independent school.
- 1.4 The proposals include a new swimming pool within a sports block which will be situated below the surrounding ground level and therefore constitutes a ‘basement’ for the purposes of this assessment. There are no new basements or other significant below ground spaces proposed as part of the development.
- 1.5 A Geo-environmental Investigation prepared by Soil Consultants, dated 5<sup>th</sup> July 2022, has been carried out to assess ground conditions and potential contamination at the site.
- 1.6 A Flood Risk Assessment report prepared by RPS Group Plc., dated March 2022, has been carried out to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk.
- 1.7 A Drainage Strategy report has been prepared by AKS Ward, dated September 2022, assessing the site, proposals and ground conditions in terms of foul and surface water drainage, and making recommendations for the incorporation of SUDS into the development.
- 1.8 This Basement Impact Assessment report was produced by Adam Sisson MEng CEng MIStructE with assistance from the AKS Ward team.

## 2.0 Description

- 2.1 The site includes multiple existing buildings which generally occupy the western portion of the site along with areas of hardstanding including footpaths and car parking. The eastern portion of the site is predominantly occupied by sports pitches and soft landscaped areas. The site is predominantly flat.
- 2.2 The site contains three grade II listed buildings: the main Kneller Hall building, the Guards’ House and the Band Practice Hall. There are several other existing buildings which are not listed.
- 2.3 It is proposed to retain the listed buildings for use as part of the school. Most other existing buildings on the site are to be demolished. It is proposed to construct new buildings on the site to provide facilities for the school including and a three storey teaching block, a sports block and a sports pavilion.
- 2.4 The sports block is to house a swimming pool, a sports hall and exercise studios, with associated changing and storage rooms. The studios and changing rooms are located within a two-storey element of the building between the swimming pool and sports hall. The swimming pool is located at the southern end of the block.
- 2.5 The band practice hall is located 9.3m to the south of the sports block. Plant and maintenance facilities will be located 6.9m to the north of the sports block. The proposed teaching block is to be located 13m to the southwest of the sports block. Refer to Location Plan.

## 3.0 Ground Conditions

- 3.1 Ground conditions encountered across the site during the site investigation are as follows:
  - Made Ground 0.1 to 3.5m thick. Variable cohesive and granular
  - Alluvium (within infilled lake) 0.2 to 1.25m thick. Peaty/organic clay
  - River Terrace Deposits (not all locations) 1.15 to 4.9m thick. Gravels and sands of variable density
  - Soliflucted Material (not all locations) 0.6 to 4.7m thick. Gravelly clay
  - London Clay depth not proven (max borehole depth 25m)
- 3.2 Borehole BH01 was located within the proposed footprint of the swimming pool which found made ground to 2.2m bgl, medium dense to dense greyish brown cobbly gravel to 5.0m bgl, medium dense sand between 5.0m and 6.10m bgl, with firm to stiff clay below 6.10m bgl. Refer to Borehole B01 log.
- 3.3 The ground water level recorded in borehole BH01 varied between 3.20 and 3.23m bgl (pipe to 6.0m bgl) during monitoring.
- 3.4 The site investigation identified that a lake previously existed on the site extending along the northern boundary which is thought to have been filled in in the post war period. The northern part of the sports block intersects the location of the lake.
- 3.5 A piled foundation solution is recommended for the sports block due to the variable ground conditions with associated risk of differential settlement.
- 3.6 The site is located within Flood Zone 1, however, an area in the northwest corner of the site is indicated to be at low risk of surface water flooding. This is associated with a topographical low where the surface runoff may temporarily pond. Currently this area is not occupied and consists of green space and it is not proposed to develop this area of the site. The area is not close to the proposed location of the swimming pool. Please refer to the Flood Risk Assessment and Drainage Strategy reports for more information.

## 4.0 Excavation Works

- 4.1 The swimming pool excavation is proposed to be made in opening cut due to the available space on site with slope battered to ensure stability of the excavation.
- 4.2 The depth of excavation to formation level is anticipated to be approximately 2.5m bgl at deep end to the pool with localised excavation to 2.8m for pilecaps etc.
- 4.3 If localised dewatering is required during construction, it is anticipated that a sump and pump system would be utilised.
- 4.4 The closest listed structure to the excavation is the Band Practise Hall which is approx. 9.3m away and beyond the zone at which surrounding ground levels are likely to be affected by the excavation. It is also proposed to underpin the Band Practise Hall as part of the development. No mitigation measures are considered necessary in relation to this, or any other listed structures in relation to the swimming pool construction.

## 5.0 Structural Strategy

- 5.1 A piled foundation solution is proposed for the sports block as a whole. A suspended RC flat slab is proposed for the ground floor spanning between pilecaps and ground beams to the perimeter of the building will support the external wall. Heave precautions will be required below the slab in the proximity of existing trees.
- 5.2 The swimming pool structure will be constructed as an insitu RC slab supported by piles with RC retaining walls forming the sides of the pool and tank chamber. Refer to Structural Sections.

- 5.3 The swimming pool excavation will result in unloading of about 50kN/m<sup>2</sup>. This stress reduction will theoretically be causing heave in the London Clay strata. A collapsible void former is proposed to prevent excessive uplift pressure on the underside of the slab.
- 5.4 A steel frame is proposed for the superstructure of the sports block with the 1st floor and roof over the two-storey element comprising precast concrete hollowcore units spanning between primary steel beams. The roof over the swimming pool will be of lightweight construction (e.g. engineered timber) supported on long span beams on the principal grid lines.
- 5.5 Lateral stability will be provided by a combination of diaphragm action of the slab, horizontal bracing to the lightweight roofs, vertical bracing within the walls and moment frames where vertical bracing is not possible.
- 5.6 For details about the construction methodology, see the submitted outline framework construction management and construction logistics plan prepared by Caneparo Transport Consultants.

## 6.0 Drainage and Groundwater

- 6.1 Soakage testing has determined that the ground is suitable for infiltration as a means of disposal of surface water. In accordance with the NPPG hierarchy, it is proposed that infiltration methods are used to drain surface water from the new buildings and paved areas. This will take the form of a soakaway between the sports and teaching blocks and a basin in the north of the site.
- 6.2 The proposed location of the soakaway is approximately 6.0m from the face of the southwestern elevation of the sports block which is greater than the 5.0m minimum recommended in the CIRIA SuDS manual. The gives a distance of approximately 12.0m between the swimming pool and the soakaway. It is proposed to construct the soakaway of cellular units to a depth of 2.2m (1.0m above groundwater level).
- 6.3 The proposed location of the swimming pool is underlain by permeable deposits (sand and gravel) which constitute an aquifer. These were found below a layer of made ground – the sands and gravels occupy a band between approximately 2.2. and 6.1m bgl below which impermeable strata were found (London Clay). The structure of the swimming pool will encroach into the aquifer by approximately 0.5m leaving 3.5m to the impermeable strata and groundwater flows are not likely to be significantly affected.

## 7.0 Site and Assessment Verification Form

### Site Details

Site Details	Applicant Information
Site name	Kneller Hall
Planning application reference (if applicable)	
Address & postcode	Kneller Hall, 65 Kneller Road, TW2 7DN
Brief description of the proposed works	Redevelopment of site to use as a school including a new sports block with swimming pool
Geology type	River Terrace Deposits over London Clay
Presence of aquifer?	Aquifer within River Terrace Deposits
Total site area (Ha)	9.7
Is the site currently known to be at risk of flooding from any sources?	Low risk of Surface Water in NW corner of site (refer to FRA)

### Chartered Professional Verification

Professional Details	Applicant Information
Name	Adam Sisson
Profession / area of expertise	Structural Engineer
Chartered institution and membership level	Chartered Member of the Institution of Structural Engineers (MIStructE)
Brief description of assessment involvement	Qualitative assessment of proposed swimming pool substructure and drainage in relation to listed buildings and ground conditions
Brief summary of the assessment results	Proposed swimming pool is not close to listed building or neighbouring buildings. Mitigation not required. Swimming pool structure is not likely to impact aquifer. Mitigation not required.
Declaration of assessment results	Mitigation not required
Signature	

## 8.0 Location plan

Refer to L221004-AKSW-ZZ-XX-DR-S-0011

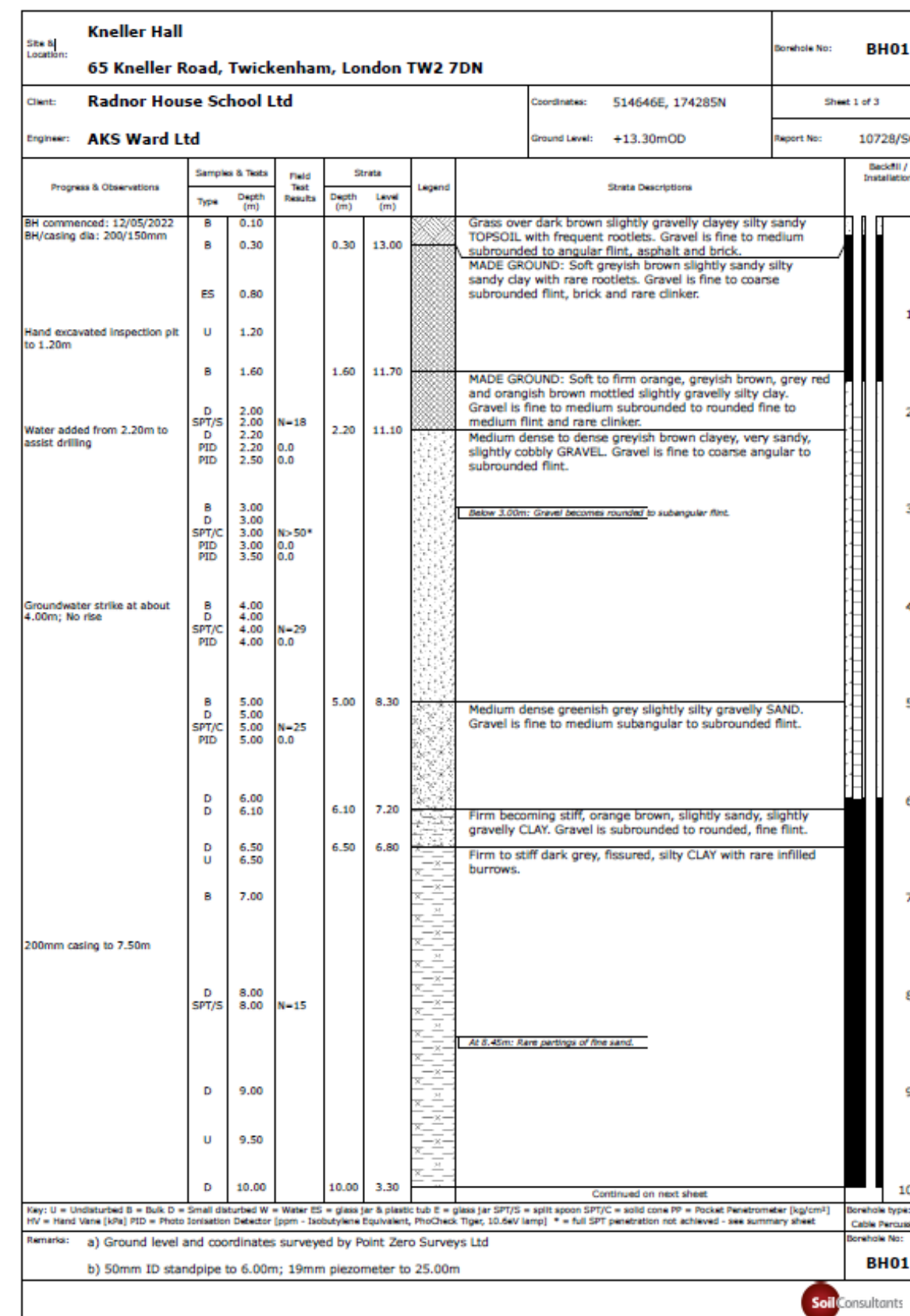
## 9.0 Swimming Pool Structural Sections

Refer to L221004-AKSW-05-B1-DR-S-7001

## 10.0 Screening Assessment Table

Category	Question	Y/N	Comments
Subterranean Characteristics	Does the recorded water table extend above the base of the proposed subsurface structure?	N	Groundwater levels during monitoring found to be 3.20 to 3.23m bgl at borehole in proposed pool location (BH1). Refer to SI.
	Is the proposed subsurface development structure within 100m of a watercourse or spring line?	N	
	Are infiltration methods proposed as part of the site's drainage strategy?	Y	Refer to drainage strategy
	Does the proposed excavation during the construction phase extend below the local water table level or spring line (if applicable)?	N	Lowest excavation approx. 2.8m below ground level
	Is the most shallow geological strata at the site London Clay?	N	Refer to site investigation report
	Is the site underlain by an aquifer and/or permeable geology?	Y	Superficial deposits permeable (principal and secondary undifferentiated aquifer) over London Clay (unproductive). Site not within a source protection zone. Refer to SI
Land Stability	Does the site, or neighbouring area, topography include slopes that are greater than 7°?	N	Refer to topographical survey
	Will changes to the site's topography result in slopes that are greater than 7°?	N	
	Will the proposed subsurface structure extend significantly deeper underground compared to the foundations of the neighbouring properties?	N	The pool is approx. 80m from the nearest neighbouring property so not likely to influence foundations. The closest building on the site is the Band Practice hall which is approx. 9.4m away
	Will the implementation of the proposed subsurface structure require any trees to be felled or uprooted?	N	Wider development requires some trees to be felled
	Has the ground at the site been previously worked?	N	
	Is the site within the vicinity of any tunnels or railway lines?	N	
Flood Risk and Drainage	Will the proposed subsurface development result in a change in impermeable area coverage on the site?	N	The pool structure will not. The wider development aims to better the better the current impermeable area. Refer to drainage strategy
	Will the proposed subsurface development impact the flow profile of throughflow, surface water or groundwater to downstream areas?	N	
	Will the proposed subsurface development increase throughflow or groundwater flood risk to neighbouring properties?	N	

## 11.0 BH01 Data Sheet



Site & Location:				Borehole No:		
<b>Kneller Hall</b> 65 Kneller Road, Twickenham, London TW2 7DN				<b>BH01</b>		
Client: <b>Radnor House School Ltd</b>		Coordinates: 514646E, 174285N		Sheet 2 of 3		
Engineer: <b>AKS Ward Ltd</b>		Ground Level: +13.30mOD		Report No: 10728/SG		
Progress & Observations	Samples & Tests		Field Test Results		Strata Descriptions	Backfill / Installation
	Type	Depth (m)	Depth (m)	Level (m)		
150mm casing to 10.30m					Stiff becoming very stiff dark grey, fissured, silty CLAY with rare infilled burrows. At 20.00m: Rare partings of black pyritic sand.	
	D SPT/S	11.00 11.00	N=17		At 11.00m: Claystone	11
	D U	12.00 12.50			Below 12.00m: Becomes slightly sandy.	12
	D U	13.00 13.00				13
	D SPT/S	14.00 14.00	N=24		At 14.00m: Rare pyrite nodules.	14
	D U	15.00 15.50				15
	D U	16.00 16.00				16
	D SPT/S	17.00 17.00	N=23		At 17.00m: Claystone.	17
	D U	18.00 18.50			Below 18.00m: Becoming locally slightly sandy.	18
	D U	19.00 19.00				19
	D	20.00		20.00 -6.70	Continued on next sheet	20
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm <sup>2</sup> ] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, ProCheck Tiger, 10.5kV lamp] * = full SPT penetration not achieved - see summary sheet						Borehole type: Cable Percussion
Remarks: a) Ground level and coordinates surveyed by Point Zero Surveys Ltd						Borehole No: <b>BH01</b>
b) 50mm ID standpipe to 6.00m; 19mm piezometer to 25.00m						

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Engineer: <b>AKS Ward Ltd</b>		Ground Level: +13.30mOD		Report No: 10728/SG		
Progress & Observations	Samples & Tests		Field Test Results		Strata Descriptions	Backfill / Installation
	Type	Depth (m)	Depth (m)	Level (m)		
	SPT/S	20.00	N=26		Stiff becoming very stiff dark grey, fissured, silty CLAY with infilled burrows. At 20.00m: Rare partings of black pyritic sand.	
	D	21.00			At 21.00m: Contains frequent infilled burrows.	21
	U	21.50				22
	D	22.00			At 22.00m: Slightly sandy.	22
	D SPT/S	23.00 23.00	N=32			23
	D	24.00			At 24.00m: Rare pyrite nodules.	24
	U	24.50				25
	D	25.00		25.00 -11.70	End of hole at 25.00m	25
Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm <sup>2</sup> ] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, ProCheck Tiger, 10.5kV lamp] * = full SPT penetration not achieved - see summary sheet						Borehole type: Cable Percussion
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3D Model For The Sports Block (Preliminary)

