

WHITEFIELD MEDICAL CENTRE

PHASE 2 GROUND INVESTIGATION REPORT

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EXECUTIVE SUMMARY

Appointment	Curtins were instructed by NHS Property Ltd to undertake a Preliminary Risk Assessment at Whitefield Library, Manchester, M45 7NY. The site is centered on NGR 380460, 405600 and covers an area of approximately 0.25Ha. It is understood the development proposal is for a refurbishment and change of use of the library to a medical centre, which includes drainage improvements, external hardstanding improvements and possible changes to the roof.
Current Site Status	The site is currently occupied by Whitefield Library which is a one-storey building in the centre of the site with associated hardstanding surround the site for carparking. The topography of the site is generally level.
Pre-Investigation Information	Earliest available mapping (1848) records the site as undeveloped agricultural land until 1969 where the library is constructed on site with associated hardstanding for parking. The site remains the same to present day. Surrounding the site was mainly fields with Pinfold Lane and Higher Lane recorded north and west of the site respectively. Between 1848 and 1923 construction in close proximity is recorded which includes residential properties. Further residential expansion is recorded between 1956 and 1972. By 1989 the day centre has been constructed 5m west of the site and further residential and commercial expansion has been recorded between 1989 to present day. BGS records show the site to be underlain by Glacial Till superficial deposits (Secondary Undifferentiated Aquifer) and Nob End Rock bedrock, which is part of the Pennine Middle Coal Measures (Principal Aquifer). There are no groundwater abstractions located within 500m of the site. The Envirocheck Report indicates the closest surface water feature is located 131m northeast of the site, isolated pond. No pollution incidents have been recorded within 250m of the site within the last 10 years. There are no surface water abstractions within 1km of the site. The site is situated within a Coal Mining Reporting Area however is not within a development high risk area. There is one recorded BGS mineral sites within 500m of the site located 390m west for Glaciofluvial deposits. There are no historical landfills, BGS recorded landfills or licensed waste management facilities located within 500m of the site.
Fieldworks Undertaken	Curtins ground investigation works were undertaken on 22nd and 23rd May 2025, comprising 2 No. Window Sample Boreholes, 4 No. Foundation Pits and, 7 No. California Bearing Ratio tests (CBRs) undertaken with a TRL Probe. Groundwater monitoring standpipes were installed within both Window Sample Boreholes. 12 No. return monitoring visits were undertaken on 4th and 18th June 2025.
Encountered Ground Conditions	Surface cover was typically tarmac with a subbase gravel to a maximum depth of 0.24m bgl. Made Ground was variable across the site. Granular Made Ground comprised brown/black slightly sandy gravel of concrete, clinker, ash, brick, ceramic and sandstone. Cohesive Made Ground was described as black soft gravelly clay with gravel of brick, sandstone and rare timber. Potential reworked clay was identified locally and described as a brown mottled grey sandy gravel clay with gravel of sandstone and coal. Glacial Till deposits were encountered directly underlying the Made Ground. Cohesive deposits were described as either stiff dark brown slightly gravelly silty clay with grave of coal or soft dark brown gravelly silty clay. Granular Glacial Till described as a brown slightly clayey fine to medium sand. Bedrock was not encountered during the ground investigation. Building foundations were identified within 2 No. of foundation Hand Pits (HP101 and HP103) and are assumed to be shallow foundations.
Environmental Laboratory Testing	The proposed extensions to the existing building are most analogous with a 'Commercial' end use scenario. Results have been screened against 'Commercial' GACs. No elevated concentrations of any of the contaminants of concern were recorded. All soil samples were screened for asbestos. No asbestos was identified.
Ground Contamination and Groundwater Assessment	A Low risk rating is identified to site end-users, from contamination in soils from direct contact, dermal uptake, soil and dust ingestion and inhalation with Made Ground soils. No exceedances of 'Commercial' GACs were recorded in any soil samples obtained during the ground investigation. A Moderate / Low risk rating is identified to construction workers, from contamination in soils from direct contact, dermal uptake, soil and dust ingestion and inhalation with Made Ground soils. Construction workers to be provided with appropriate PPE and sanitary facilities during ground works and construction works.
Geotechnical Assessment	It is understood that the existing library building is to be refurbished and possible changes to the roof (green roof and solar panels) including drainage and hardstanding improvements. Therefore a bearing capacity and settlement analysis is not required unless additional loads to the building are anticipated. The CBR values derived from the TRL DCP report high CBR values. For the purposes of preliminary pavement design, a CBR of 5% is recommended. CBR values may also vary from location to location and localised soft/ loose spots require excavating and replacement with a well-compacted granular fill.

Recommendations

The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-2 and AC-2 for Made Ground, and DS-1 and AC-1 for Glacial Till.

Based on the findings of the ground investigation, the following recommendations are made:

1. Construction workers to be provided with appropriate PPE and sanitary facilities during groundworks and construction works.
2. Obtain and review as-built drawings for appreciation of foundations and bearing capacity.
3. Further works including bearing capacity and settlement may be required if existing loads are increasing as part of the refurbishment.
4. For any new hardstanding a preliminary design CBR of 5% would be assumed. CBRs presented within this report are only preliminary and further testing must be undertaken for confirmation.

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1 INTRODUCTION

1.1 Project Background

Curtins were instructed by NHS Property Ltd to undertake an intrusive site investigation at Whitefield Library located on Pinfold Lane, Whitefield, Manchester, M45 7NY.

It is understood the development proposal is for a refurbishment and change of use of the library to a medical centre, which includes drainage improvements, external hardstanding improvements and possible changes to the roof.

The site is situated on National Grid Reference 380460, 405600 and covers an area of approximately 0.25Ha.

Proposed development plans are enclosed in Appendix A.

1.2 Scope of Services

This investigation aims to characterise the geo-environmental and geotechnical conditions for the proposed works.

Specifically, the Phase 2 report is intended to determine:

- a) Characterise shallow site soils and determine geotechnical parameters to inform a foundation assessment, specifically to determine the suitability of existing foundations to be used to support the additional building loads associated with the development.
- b) Likelihood of the proposed works being adversely impacted by potential geo-hazards across the site.

Detailed flood risk assessment, ecology and archaeological studies are outside the scope of this report.

2 PHASE 1 PRELIMINARY RISK ASSESSMENT

This section presents a summary of the current site setting, history, geology, and hydrogeology/hydrology, previously detailed in the Curtins Phase 1 Report (Ref. 1). As such, it is advised that this report is read in conjunction with the Phase 1 Report (Ref. 1). A summary of the pertinent Phase 1 Preliminary Risk Assessment Report information specifically for the proposed development site is presented in the following sub-sections.

This information will feed into the geotechnical assessment (refer to Section 8.0) and geo-environmental risk assessments (refer to Section 7.0).

2.1 Current Setting

The site is occupied by the former Whitefield Library which comprises of a one-storey structure (located centrally) with associated hardstanding. Hardstanding carparks are present in the north and south of the site. An area of soft landscaping with mature trees are located within the northeast section of the site. The topography of the site is generally level.

The site surrounding land use is summarised in *Table 1*.

Table 1 – Surrounding Area

Surrounding Area	N	Pinfold Lane with residential properties beyond.
	E	Residential properties.
	S	Residential apartments with Higher Lane Primary School beyond.
	W	Day Centre building and car parking (assumed to be associated with the library) with Higher Lane and Young Athlete Academy with playing fields beyond.

2.2 Site History

A review of the available historical map information for the site, as presented within Curtins Phase 1 Report (Ref. 1) has been undertaken with specific reference to potential sources of contamination and geohazards.

Earliest available mapping (1848) records the site as undeveloped agricultural land until 1969 where the library is constructed on site with associated hardstanding for parking. The site remains the same to present day.

Surrounding the site was mainly fields with Pinfold Lane and Higher Lane recorded north and west of the site respectively. Between 1848 and 1923 construction in close proximity is recorded which includes residential properties, with the closest recorded 10m east of the site, and a school. Further residential expansion is recorded between 1956 and 1972. By 1989 the day centre has been constructed 5m west of the site and further residential and commercial expansion has been recorded between 1989 to present day.

2.3 Published Geology and Hydrogeology

A review of British Geological Survey (BGS) map, 1:50,000 Scale, Bedrock and Superficial Editions, Manchester, Sheet 085, 2006 indicates the following geological sequence:

- Glacial Till overlying;
- Nob End Rock.

2.3.1 Made Ground Deposits

The BGS maps do not indicate Made Ground on site, however given the phases of development both on-site and in the immediate surrounding area, Made Ground is anticipated.

2.3.2 Superficial Deposits

Superficial deposits are recorded as Glacial Till.

Glacial Till is typically described as a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

2.3.3 Bedrock Deposits

Bedrock deposits are indicated to be Nob End Rock, which generally comprises well bedded sandstone. Which is also part of the Pennine Middle Coal Measures Formation.

2.3.4 Mining and Quarrying

The site is located within a Coal Mining Reporting Area. However the site is not within a Development High Risk Area.

There was one recorded BGS mineral site within 500m of the site. This was located 390m west of the site for Glaciofluvial deposits however the status is recorded as ceased.

Based on the above, the likelihood of encountering relic mining features on-site is unlikely and therefore has not been considered further.

2.3.5 Other Pertinent Existing Geological Records

The Curtins Phase 1 Report (Ref. 1) confirms that there is 'no hazard to very low risk' from the following ground stability hazards on and around the site: collapsible ground, compressible ground, running sands, landslides, shrinking or swelling clay, running sands and ground dissolution.

UK Radon Mapping (Ref. 2) confirms the site is situated in an area where <1% of homes are above the radon action level.

The Curtins Phase 1 Report (Ref. 1) confirms that there are no BGS recorded faults onsite or within 150m of the site. The closest fault is recorded 160m north of the site aligned east to west.

2.4 Hydrogeology and Hydrology

The Nob End Rock bedrock is classified as a Secondary A Aquifer, defined as:

"Secondary A Aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers."

The Glacial Till deposits are classed as a Secondary Undifferentiated Aquifer, defined where:

"This is assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type."

The nearest surface water feature is located approximately 131m from site to the northeast, which appears to be an isolated pond. There are no pollution incidents to controlled waters that have occurred on site in the last 10 years.

There is no surface water abstraction point within 1km of the site.

There are no active discharge consents within 700m of the site.

2.5 Landfill & Pollution

A review of existing report undertaken within Curtins Phase 1 (Ref. 1) identified no currently operational or historical landfills within 250m of the site.

There are no licensed waste management facilities within 1km of the site.

2.6 Ground Gas Sources

The Envirocheck report identifies four records of potentially infilled land (water) within 250m of the site. The nearest is located 103m north of the site dated 1923 which seems to be a small pond which was infilled before a house was built.

The Envirocheck and UK Radon mapping (Ref. 2) confirms the site is situated in an area of where less than 1% of homes are estimated to be at or above the Radon Action Level. On this basis, it is unlikely that radon protection measures will be required.

Where the new development incorporates a basement, advice of a specialist Radon assessor should be obtained.

2.7 Unexploded Ordnance (UXO) Risk Assessment

UXO Risk Mapping indicates that the risk posed by UXO associated with WW2 bombing to be **Low**-Risk within the site. Areas designated as High-Risk are those where the bombing density from World War II is relatively low, typically up to 10 bombs per 1000 acres.

Based on the forgoing commentary, the likelihood of encountering UXO on site as part of the intrusive ground investigation works is **Low** and therefore has not been considered further.

The Principal Contractor should undertake their own risk assessments with respect to encountering UXO during construction.

If unexploded ordnance is discovered during any works, stop immediately, prevent access to the area, and inform the police. If the site boundary or location changes then the UXO risk should be reassessed.

2.8 Summary of Phase 1 PCSM

A summary of the potential pollutant linkages of the development site identified, from the Whitefield Desk Study Report (Ref. 1) and Curtins analysis of online sources and other previous reports, are presented in *Table 2* below. Further investigation was recommended to enable the safe redevelopment of the site.

Table 2 – Summary of Phase 1 PCSM

Source	Pathway	Receptor	Risk
Potential Made Ground of unknown composition associated with previous library and parking.	Direct contact – Dermal contact, soil ingestion and dust inhalation	Site End Users	Moderate/ Low
Potential asbestos onsite due to building being constructed in a period where asbestos containing materials may have been used.	Indirect contact – Vapour inhalation	Construction Workers	
	Plant uptake	Buried Structures – Aggressive Ground Conditions	
	Leaching and percolation into controlled waters	Controlled Waters - Groundwater	Low
	Groundwater migration and run-off to surface waters	Controlled Waters – Surface Water	
Ground Gases – sources of unknown material that has the potential to contain organic / putrescible material.	Permeation through ground and intrusion into buildings and structures.	Site end users	Moderate/Low
Radon	Permeation through ground floor.	Site end users	Low

Based on the findings of the Preliminary Site Assessment, it is considered that the risks associated with ground contamination pertaining to the redevelopment of the site are Low or Very Low and therefore are not considered further.

Ground conditions are expected to comprise a limited thickness of granular and cohesive Made Ground deposits overlying cohesive Glacial Till. Bedrock deposits are anticipated to comprise of Nob End Rock which is part of the Pennine Middle Coal Measures Formation. Foundations are anticipated to be traditional pad foundations founded upon the cohesive Glacial Till.

Should any unexpected contamination be encountered during construction works should be stopped and a geo-environmental engineer contacted.

3 PHASE 2 INVESTIGATION SCOPE OF WORKS

Site investigation works were undertaken on 22nd and 23rd May 2025.

The scope of the ground investigation was designed in general accordance with current UK guidance including ICE UK Specification for Ground Investigation, Third Edition (2020) (Ref. 3) and with techniques outlined in Eurocodes 7 - BS EN 1997-1:2007 (Ref. 4), BS 5930:2015+A1:2020 Code of Practice for Ground Investigations (Ref. 5).

The scope and rationale are summarised in *Table 3*.

Table 3 – Ground Investigation Scope of Works

Exploratory Hole Type	Exploratory Hole Reference	Exploratory Hole Depth (m bgl)	Rationale
Windowless Sample Boreholes	WS101	4.45	- Characterise shallow ground and groundwater conditions. - Collect soil samples for geotechnical testing. - Undertake in-situ testing. - Install boreholes for groundwater level monitoring.
	WS102	4.45	
Hand Excavated Foundation Pit	HP101	0.92	Confirm the depth and dimensions of the existing structures' foundations.
	HP102*	0.26	
	HP103	1.20	
	HP104	1.20	
TRL DCP Probes	CBR1	0.22	- Confirm the matrix of hardstanding surface cover. - Derive an estimated CBR values.
	CBR2	0.24	
	CBR3	0.18	
	CBR4	0.17	
	CBR5	0.22	
	CBR6	0.09	
	CBR7	0.18	

* Progression of the HP102 was terminated due to proximity to utility services.

3.1 Soil Logging and Sampling

Exploratory borehole arisings were logged on site by a qualified Engineer. All exploratory holes were logged in accordance with the requirements of BS 5930:2015+A1:2020 (Ref. 5) including recording observed visual and olfactory indications of contamination. Exploratory hole logs are provided in *Appendix B*.

3.2 Monitoring Well Installations

Groundwater monitoring slotted 50 mm diameter pipes were installed within both window sample boreholes.

A bentonite seal was placed above and below the screened section (response zone) of the borehole to minimise potential for downward migration of contaminants and the creation of a preferential migratory pathway. A gravel aggregate surround was installed in the annulus between the sides of the borehole in the response zone. The monitoring wells were primarily designed to assess the potential for ground gas and groundwater monitoring.

The installed response zones are summarised in *Table 4* below.

Table 4 – Monitoring Well Response Zones

Exploratory Hole Ref	Response Zone(s) m bgl (m AOD)	Strata Description
WS101	2.85 – 3.85 (107.35 – 106.35)	Glacial Till (Granular)
WS102	2.50 – 3.50 (108.40 – 107.40)	Glacial Till (Granular & Cohesive)

Copies of borehole logs can be referred to in *Appendix B* of this report.

3.3 Post Investigation Monitoring

3.3.1 Groundwater Monitoring

Two groundwater level monitoring visits were undertaken on 4th and 18th June 2025, to assess the groundwater conditions.

4 LABORATORY ANALYSIS

Representative soil samples were selected for laboratory geotechnical testing, based on field observations and the development proposals.

Selected environmental soil samples were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical analysis was Envirolab (UKAS and MCERTS accredited), and for geotechnical analysis was i2 Analytical (UKAS and MCERTS accredited).

Sampling positions were generally located in a non-targeted, systematic array to give adequate and representative coverage of the site's proposed end use and the immediate environmental setting.

The Preliminary CSM carried out as part of the Phase 1 appraisal summary has shown a low risk to human health and controlled waters (groundwater and surface water). As no gross contamination was identified during the ground investigation, it was determined that there was no requirement to obtain groundwater samples.

The contaminants of concern potentially present on the site were considered to include, amongst others; organic matter, fill, hydrocarbons (e.g. fuel/oils) the extent of which is captured by the broad environmental testing suite listed in *Table 5*.

Table 5 – Environmental Chemistry Analysis Suite: Soils

Suite Ref	Analyte	LOD
Soils Suite A	Asbestos Screen, pH and Soil Organic Matter (SOM)	-
	Arsenic, Chromium, Chromium VI, Copper, Lead, Selenium, Zinc, Nickel	1 to 5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg
	PAHs (USEPA 16)	0.1 to 0.8 mg/kg
	TPH (Aro/Alk Split)	0.01 to 0.1 mg/kg
	Water Soluble 2:1 Sulphate	0.01 g/l

A total of 5 No. Made Ground soil samples were obtained during the ground investigation and scheduled for chemical analysis as described in *Table 5* above.

4.1 Geotechnical Analysis

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 6). The field and laboratory geotechnical testing undertaken is summarised in *Table 6*.

Table 6 – Geotechnical Testing Soils

Test Type.	Quantity	Standard
In Situ Testing		
Standard Penetration Test	8	BS 5930:2015+A1:2020
Laboratory Testing		
pH	10	BS1377:1990, Part 3
Water Soluble Sulphate 2:1 SO ₄	10	BS1377:1990, Part 3
Water Content	5	BS1377:1990 Part 2
Atterberg 4 Point	3	BS1377:1990 Part 2
Particle Size Distribution (wet sieve)	2	BS1377:1990 Part 2

The results of the geotechnical testing are summarised in *Section 6.0* of this report. Copies of the geotechnical testing certificates are presented in *Appendix E*.

5 GROUND CONDITIONS

The ground conditions generally comprise hardstanding surface coverings underlain by a granular subbase. Granular and cohesive Made Ground was then underlain by cohesive and granular Glacial Till.

5.1 General

A summary of the ground conditions encountered during the intrusive investigation works around the perimeter of the existing building is presented in Table 7, with detailed information presented in the exploratory hole logs included in Appendix B.

Table 7 – Summary of Ground Conditions Encountered

Strata	Depth to Top of Strata m bgl (m AOD)		Recorded Thickness (m)		Description
			Min	Max	
Made Ground (Surface Cover and sub-base)	0.00 (Ground Level)	0.05 (110.85)	0.02	0.24	Tarmacadam Or concrete flagstone (HP104 only). Overlying Light or dark grey gravel of limestone or tarmac. Or Concrete with rebar encountered locally.
Made Ground	0.17 (110.79)	0.60 (109.60)	0.08	0.70	Brown very sandy gravel with frequent cobbles. Gravel of brick, concrete, sandstone, ceramic and plastic. Or Black gravel of clinker, ash, brick and wood fragments. Or Black soft gravelly clay. Gravel of brick, sandstone and rare timber.
(Potentially) Reworked Ground	0.18 (110.72)	0.60 (111.56)	0.60	0.96	Firm brown mottled grey slightly sandy gravelly clay. Gravel of sandstone and coal fragments.
Glacial Till	1.00 (109.90)	4.00 (106.20)	0.45 ¹	2.00	Stiff dark brown slightly gravelly silty clay. Gravel of coal. Or Soft dark brown slightly gravelly silty clay. Occasional gravel of wood fragments (WS101 only). Or Brown slightly clayey fine to medium sand.

¹Unproven thickness.

5.2 Made Ground

Made Ground deposits were encountered from surface to a depth of 2.80m bgl (107.40m AOD), and comprised of either tarmac or a paving slabs, over granular material, over cohesive material.

The surface covering comprises tarmac or paving slabs (HP104 only) underlain by a sub-base comprising of either a light or dark grey gravel of limestone or tarmac or concrete, with rebar 1cm thick encountered within WS102 and HP102.

Made Ground deposits were encountered under the sub-base with granular Made Ground described as a brown very sandy gravel with frequent cobbles or a black gravel of clinker, ash, brick and wood fragments. Cohesive Made Ground encountered as a black soft gravelly clay. Gravel of brick, sandstone and rare timber.

Reworked clay was encountered within WS102, HP101, HP103 and HP104 at depths between 0.18m to 0.60m bgl (110.72–11.56m AOD). This material was described as firm brown mottled grey gravelly clay, with the gravel comprising sandstone and coal, locally containing brick within HP103.

5.3 Glacial Till Deposits

Cohesive Glacial Till Deposits were encountered underlying the Made Ground at a depth of between 1.00 and 1.30m bgl (109.90-108.90m AOD), within the window samples only, comprising firm dark brown slightly gravelly silty clay. Within WS101 cohesive glacial till was encountered underlying granular glacial till from 4.00m bgl (106.20m AOD), comprising Firm brown gravelly clay. Gravel comprised sandstone and coal fragments.

Granular glacial Till deposits were encountered underlying the Cohesive Glacial Till at a depth between 2.80m and 3.00m bgl (107.40-107.90m AOD). Granular deposits comprised brown slightly clayey sand and light brown silty clayey sand.

5.4 Obstructions Encountered

No obstructions were encountered during the site investigation works.

Window sample boreholes collapsed during drilling. WS101 collapsed from 4.00m bgl to 2.00m bgl and was redrilled to 4.00m bgl. WS102 collapsed from 4.00m bgl to 3.00m bgl, redrilled to 4.00m bgl then collapsed again to 3.50m bgl.

5.5 Existing Foundations

Trial pits were undertaken adjacent to the Whitefield Library building to confirm the presence and assess the suitability of foundations to facilitate the proposed redevelopment to a medical centre and possible changes to the Full detailed cross sections and photographic logs are provided within Appendix C. A summary of the encountered foundations is presented in the following sections.

5.5.1 HP101

Within HP101 the concrete foundation was encountered at a depth of 0.65m bgl (110.31m AOD). The concrete protrudes out 0.30m from the external building wall and had a thickness of 0.25m. The base of the hand pit was extended to 0.92m bgl and was underlain by reworked from brown gravelly clay.

5.5.2 HP102

HP102 did not encounter the building foundation. The hand pit was terminated at 0.26m bgl (110.64m AOD), the pit was unable to be extended due to utility services in close proximity.

5.5.3 HP103

Within HP103, a concrete foundation was encountered from 1.10m bgl (109.11m AOD). The concrete step protrudes 0.41m from the external building wall to a depth of 1.20m bgl, however the full extent was not proven due to the depth of the excavation.

5.5.4 HP104

No Building foundation was identified within HP104. The hand pit was terminated at a depth of 1.20m bgl and was probed to a depth of 1.50m bgl (109.66m AOD) with no foundation encountered. Reworked sandy gravelly clay was encountered from 0.60m to 1.20m bgl.

5.6 Groundwater

A groundwater strike was encountered within both window sample location at 3.80m bgl within WS101 and 3.00m bgl within WS102. These water strikes were recorded within the granular Glacial Till.

Two groundwater monitoring visits have been undertaken on the 4th and 18th June 2025, the results of which are presented in Table 8.

Table 8 – Groundwater Monitoring Results

Location	Installation Strata	Response Zone(s) m bgl	Depth	m bgl (m AOD)
			04/06/25	18/06/25
WS101	2.85 – 3.85 (107.35 – 106.35)	Glacial Till (Granular)	1.50	1.40
WS102	2.50 – 3.50 (108.40 – 107.40)	Glacial Till (Granular & Cohesive)	2.39	2.41

5.7 Observed Potential Contamination

No visual or olfactory contamination beyond anthropogenic inclusions within the Made Ground deposits was noted during the intrusive works.

6 GROUND MODEL

6.1 Made Ground

Due to the variable nature of Made Ground in terms of strength and composition, this layer is not deemed to be a suitable founding stratum. As such, limited geotechnical testing was undertaken on this stratum and characteristic geotechnical design parameters have not been derived.

Table 9 – Summary of Geochemical Test Results – Made Ground

Parameter	No. of Tests	Results	
		Min	Max
Field Tests			
SPT 'N' Value (uncorrected)	1	2	
Laboratory Tests – General			
Water Content (%)	5	3.6	12.9
pH	5	6.28	10.78
Water Soluble Sulphate (mg/l)	5	3	52

6.2 Glacial Till

A summary of the field and laboratory test results from samples of Glacial Till are summarised in Table 10.

Table 10 – Summary of Geotechnical Test Results – Glacial Till

Parameter		No. of Tests	Min	Results	Max
Field Tests					
SPT 'N' Value (uncorrected)	Cohesive	4	8	14	
	Granular	3	13	17	
Laboratory Tests – General					
Atterberg Tests	Liquid Limit (%)	3	25	31	
	Plastic Limit (%)	3	14	18	
	Plasticity Index (%)	3	7	17	
	Modified Plasticity Index (%) ¹	3	7	17	
Water Content (%)		5	3.6	12.9	
pH		5	4.89	8.58	
Water Soluble Sulphate (mg/l)		5	<10	96	

Parameter	No. of Tests	Results	
		Min	Max
Particle Size Distribution Tests	2	See Figure 6	

¹ Modified in accordance with BRE Digest 240 (1993)

The SPT 'N' (uncorrected) results for the cohesive Glacial Till Deposits range between 8 and 14. The SPT 'N' (uncorrected) results are plotted against elevation in *Figure 1*.

A total of 3 No. Atterberg Tests were undertaken within the cohesive Glacial Till, reporting a modified Plasticity Index result between 7% to 17% suggesting that the cohesive material has a low volume change potential in accordance with the NHBC Technical Standard, Chapter 4.2, Building near trees (Ref. 7).

A Casagrande Chart showing Plasticity Index plotted against Liquid Limit is provided as *Figure 2*.

The undrained shear strength (c_u) of the cohesive Glacial Till Deposits has been estimated through the relationship between SPT 'N' Values and Plasticity Indices (Ref. 8)

The estimated undrained shear strength (c_u) of the cohesive Glacial Till Deposits is determined using the relationship between SPT N_{60} values and the Plasticity Index (PI) (Ref. 9) as presented in Equation 1:

$$c_u = \text{SPT } N_{60} \times f_1 \quad [\text{Equation 1}]$$

Where:

SPT N_{60} is Corrected Standard Penetration Test

f_1 is the Stroud factor

In the absence of an SPT Energy Certificate uncorrected SPT N values have been used. A conservative f_1 value of 5.5 was chosen based on the highest modified PI of 17% (across all cohesive results). Therefore, for an SPT N value of 24, estimated c_u values range between 44 to 77kPa, indicating medium to high strength clay.

Characteristic weight densities of 17kN/m³ is recommended depending on the strength of the clay, based on BS 8004:2015+A1:2020 for soils above the water table (Ref. 9).

Based on the modified Plasticity Index results which ranged between 7% and 17% and the relationship between PI and drained angle of shear strength (Ref. 10), an Angle of Shearing Resistance (ϕ) of 25° is recommended.

As shown within the particle size distribution tests, the Granular Glacial Till encountered indicates that these soils are similar in composition to the exploratory borehole log descriptions. The results in *Appendix E* and a summary of the results is provided in *Figure 3*.

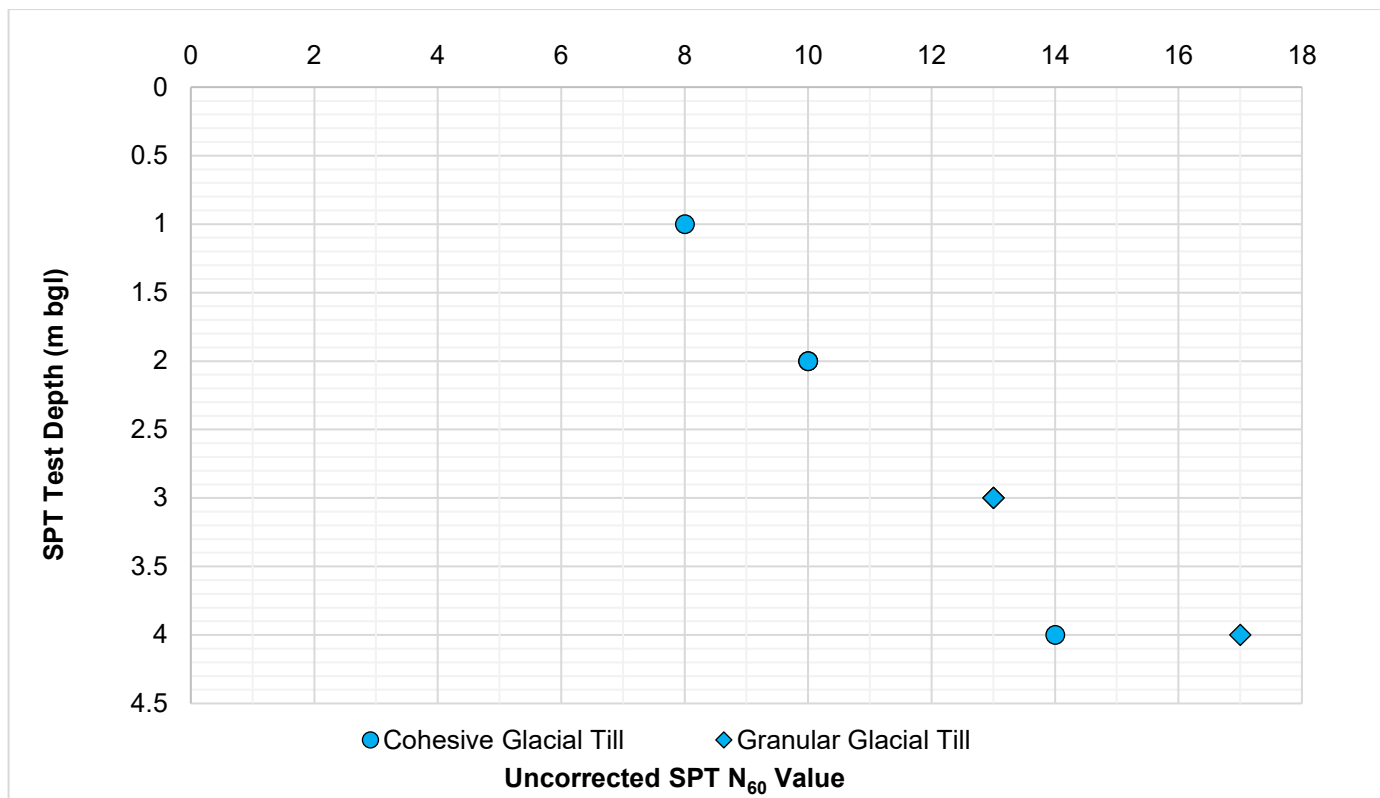


Figure 1 – SPT 'N' Values (uncorrected) vs. Depth (m bgl)

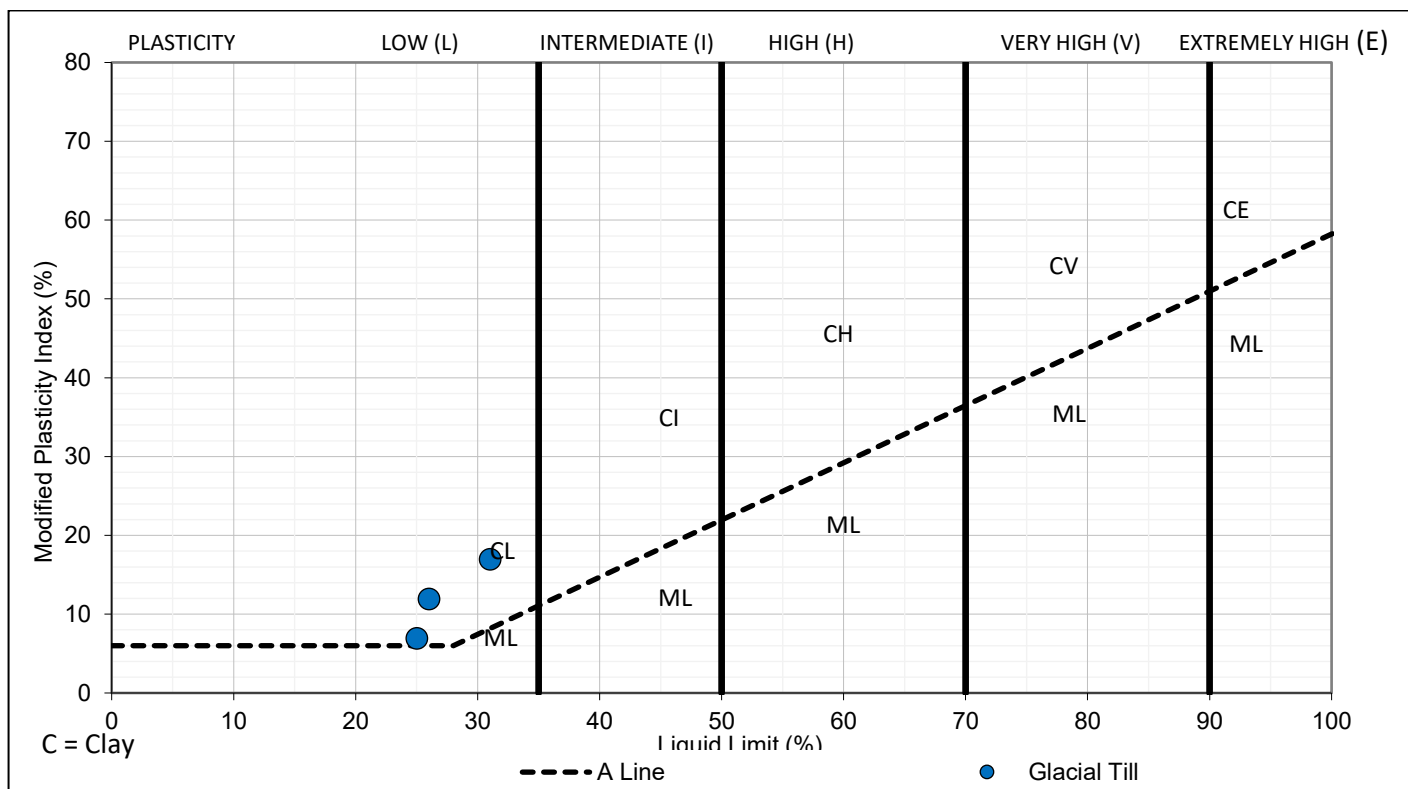


Figure 2 – Casagrande Plasticity Chart – Cohesive Glacial Till

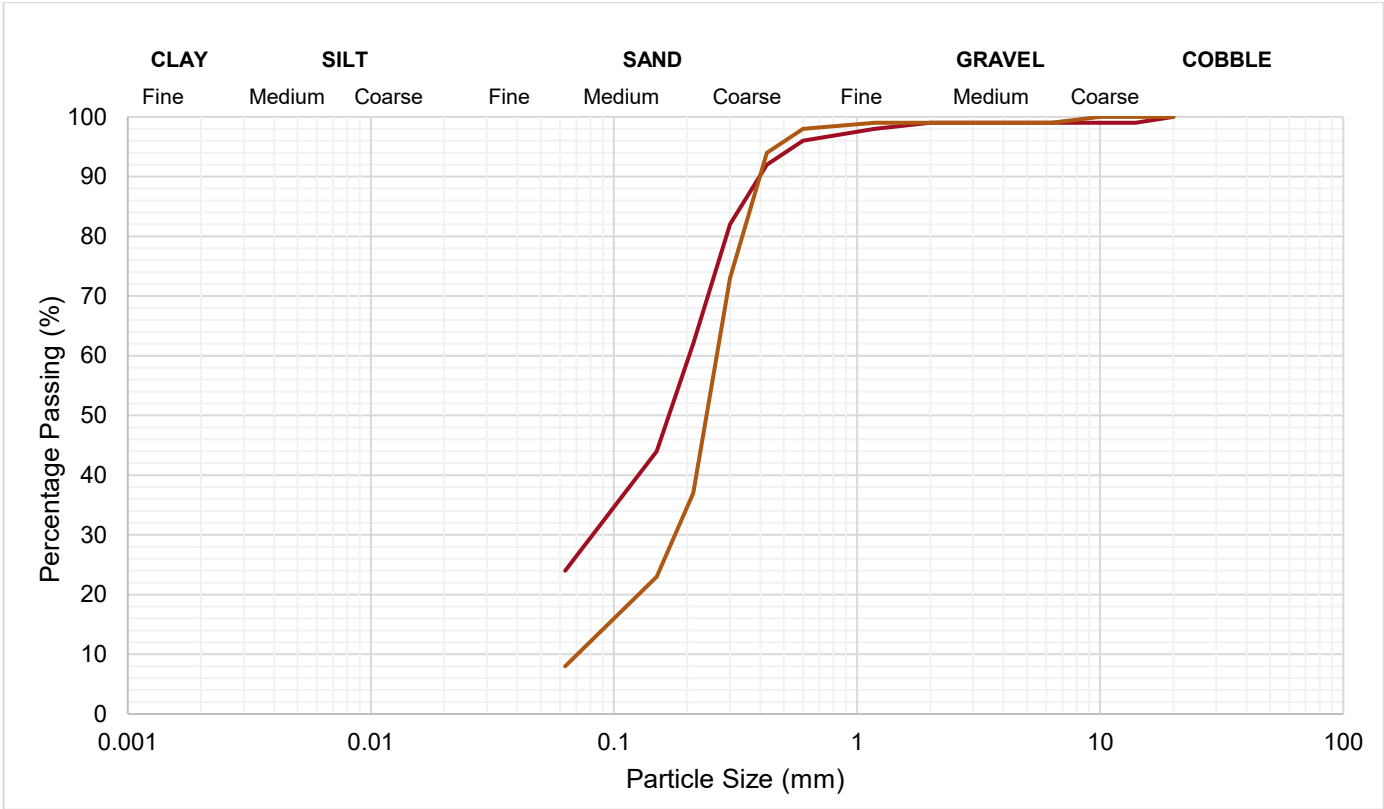


Figure 3 – Particle Size Distribution (Glacial Till)

6.3 CBR

7 No. of TRL probes were progressed from the base of the subbase (0.06-0.30m bgl). The full results are enclosed within Appendix E.

High CBRs were recorded from the TRL probe results, this is likely associated with the underlying subbase and granular Made Ground.

6.4 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd edition of 2005 (Ref. 11). Results obtained from the site are summaries within Table 11, and Table 12 details the classification.

Table 11 – Summary of BRE Suite Results

Stratum	Quantity	Range
Made Ground	pH	6.28 – 10.78
	Water Soluble Sulphate (mg/l)	30 – 520
Glacial Till	pH	4.89 – 8.58
	Water Soluble Sulphate (mg/l)	13 – 96

Table 12 – Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Made Ground	DS-2	AC-2
Glacial Till	DS-1	AC-1

(1) ACEC assessment was based on the mobile groundwater condition in a brownfield scheme area.

7 GROUND CONTAMINATION ASSESSMENT

This section of the report includes the assessment of the potential contamination, solid, liquid and gas, identified on the subject site which may present a risk to the proposed end users, associated utilities, and the wider environment.

In LCRM guidance published by the Environment Agency (Ref. 13), the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship.

These models have a common approach, which is one of a tiered assessment. At each stage of the assessment further detail can be applied to the conceptual site model to provide a detailed interpretation on a site by site basis. As part of the planning process this approach is adopted to establish either if the site is 'suitable for use' or whether additional work or else remedial work is required for the site to be deemed so.

The sub-sections hereafter therefore incorporate the second Tier (Tier 2) of the approach described in EA guidance, otherwise referred to as the Generic Quantitative Risk Assessment (GQRA). The GQRA builds on the qualitative risk assessment (Tier 1) presented in the Phase 1 Desk Study (Ref. 1), in conjunction with observations made during the ground investigation and is based solely on the results of the chemical and other testing data obtained as part of Curtins ground investigation. The GQRA is used to build/refine the Conceptual Site Model (CSM) for the site as detailed and presented in Section 9.0 of this report.

More detail on Curtins risk assessment methodology, rationale and hierarchy for human health risk assessment is enclosed in Appendix H.

7.1 Human Health GQRA

7.1.1 Adopted Soil Human Health GACs Screening Methodology

The ground investigation was undertaken to assess ground conditions around the existing building. Building footprints will occupy the ground in the immediate vicinity of the soil samples obtained during this investigation, and consideration is given to the risk presented to the end users of the building, including staff, patients and visitors. The proposed land use in these areas is most analogous with a '*Commercial*' end use scenario.

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e., the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the site ranged from 0.22% to 11.4%. Consideration of the geometric mean results in calculated values of 2.65% for the Made Ground soil samples.

As such, a comparison against Tier 1 thresholds for an SOM of 2.5% for all the samples has been adopted for the *Commercial* end-use. The adopted GAC's are listed in *Appendix G*.

7.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix D*, with testing undertaken on a total of five soil samples across the site.

With respect to the '*Commercial*' end use, soil chemical analysis results did not record any exceedances when compared against GAC screening thresholds. Furthermore, no exceedances of 'residential with home grown produce' thresholds were recorded.

All soil samples were screened for asbestos. No asbestos was identified.

8 REVISED CONCEPTUAL SITE MODEL

The Preliminary Conceptual Site Model (PCSM) presented in the Phase 1 Report (Ref.1) and discussed in *Section 2.0* of this report has been revised following the GQRA in *Section 7.0* above. The Revised Conceptual Site Model (CSM) is summarised in the table overleaf.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified as relevant for the site. The GQRA details the associated level of risk relating to these potential pollutant linkages.

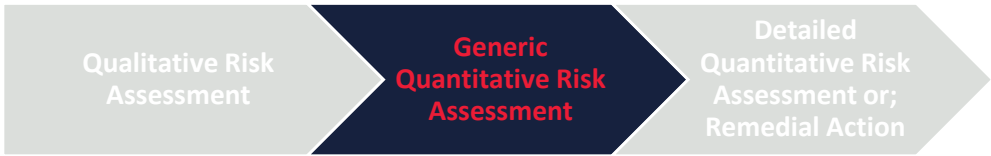
The CSM follows the framework outlined within CIRIA C552 (Ref. 14) which is summarised within *Appendix H*.

The 'risk rating' within the CSM refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

Risks presented by Mining are discussed and assessed within *Section 2.3.4*.

Risks presented by Unexploded Ordnance are discussed and assessed in *Section 2.7*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors, and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 15) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements. Reference should be given to the environmental testing results discussed within *Section 7.0* and presented within *Appendix D*.



- The table below represents the Second stage in the land quality risk assessment process; the Revised Conceptual Site Model following the Quantitative Risk Assessment.
- For a development site to be deemed ‘suitable for use’ the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g., remedial action.

Conceptual Site Model			Qualitative Risk Assessment			Recommended Actions	Actions
Source	Pathway(s)	Receptor(s)	Consequence	Likelihood of Occurrence	Risk Rating		
No significant sources of potential contamination within Made Ground Soils	Direct contact and dermal uptake, soil and dust ingestion, dust & migration inhalation	End user of site Medical Centre staff and patients	Medium Chronic health risk.	Unlikely	Low	No exceedances above commercial General Assessment Criteria were identified. No asbestos containing materials identified during the ground investigation.	Construction workers to be provided with appropriate PPE and sanitary facilities.
	Vertical and horizontal migration through the superficial deposits (soils).	Construction Workers		Unlikely	Moderate/Low		
Ground Gases – sources include sources of unknown material that has the potential to contain organic / putrescible material.	Vertical and horizontal migration through existing service corridors and Made Ground.	End users of site	Medium Chronic health risk.	Unlikely	Low	No organic / putrescible material identified onsite.	No further action required

9 SUMMARY OF POTENTIAL POLLUTANT LINKAGES

A **Low-risk** rating is identified to site end-users and to construction workers, from contamination in soils from direct contact, dermal uptake, soil and dust ingestion and inhalation with Made Ground soils. No exceedances of Commercial General Assessment Criteria were identified within soil and no asbestos containing materials were identified during the ground investigation. Construction workers should be provided with appropriate PPE and sanitary facilities with respect to the environmental testing results enclosed herein.

A **Low-risk** rating is identified for any ground gas generating sources.

10 ENGINEERING ASSESSMENT AND RECOMMENDATIONS

10.1 Introduction

This section will assess the relevant geotechnical issues for the proposed development based on the assessments. Development proposals include change of use from a library to a medical centre which includes drainage improvements, external hardstanding improvements and possible changes to the roof (green roof, solar panels). At this stage it is not known if the proposed change of building use will result in additional loads on the existing foundations. If additional loads are anticipated, additional bearing capacity and settlement checks may be required to assess estimated additional settlement.

The existing library building, where the foundations were encountered, appear to be on shallow footings on potentially reworked clay at approximately 1.00m bgl.

It should be noted that detail may change in the development of designs beyond the issue of this Report and the Construction Designer should satisfy themselves regarding the adequacy of their design and proposed approach to construction by reference to the on-going project design proposals, the ground investigation information, and their own examination of the site.

10.2 Summary of Ground Conditions

The ground conditions encountered during the Curtins ground investigation generally comprised of Made Ground deposits to a depth of 1.30m bgl, overlying possible reworked clay in close proximity and underlying the existing building, underlain by cohesive and granular Glacial Till deposits to a depth of 4.45m bgl. Bedrock was not encountered during the site investigation.

Groundwater strikes were recorded in both window sample hole locations during the ground investigation works. It is considered likely that this is representative of perched groundwater within the superficial granular deposits.

The characteristic geotechnical parameters recommended for use in the design based on the ground conditions encountered are discussed in *Section 5.0* and *Section 6.0*.

10.3 Excavations

Should any excavations be undertaken as part of the works, it is considered that excavations to <1.20m bgl should stand unsupported in the short term at suitable batters. Side support for safety purposes should of course be provided to all excavations which appear unstable, and those >1.20m deep, in accordance with Health and Safety Regulations. Suitable side slope batters may be required. These must be designed by a suitably qualified temporary works contractor for any excavations.

Groundwater may be encountered as seepages in shallow excavations for foundations or utilities as perched water. Pump type pumping is likely to be a suitable dewatering technique should groundwater begin to accumulate.

All excavation temporary works shall be designed by a suitably qualified temporary works contractor for any excavations.

10.4 Foundation Design

No new structures are proposed and therefore a bearing capacity is not required.

Should this change, this report should be updated. For an appreciation of the existing building bearing capacity, it is recommended that as built drawings are reviewed.

Where additional loads are to be placed on existing foundations this would need to be quantified to allow further assessment of settlement.

10.5 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest 1(Ref. 11) and laboratory testing undertaken accordingly in *Section 7*. Based on the laboratory test results for Design Sulphate Class and an ACEC class, DS-2 and AC-2 for the Made Ground and DS-1 and AC-1 for the Glacial Till.

11 CONCLUSION AND RECOMMENDATIONS

11.1 Geotechnical

It is understood that the existing library building is to be refurbished and possible changes to the roof (green roof and solar panels, as well as drainage and hardstanding improvements).

Therefore a bearing capacity and settlement analysis is not required unless additional loads to the building are anticipated. Additional loads would need to be quantified to allow further assessment.

The CBR values derived from the TRL DCP report high CBR values, typically >10%. This is likely attributed to the underlying granular sub-base and granular Made Ground. For the purposes of preliminary pavement design, a CBR of 5% is recommended. This value is not relevant to cohesive materials. It is important to note that deterioration of the sub-grade may occur in adverse weather conditions and therefore open excavations should not be left exposed for long durations without some form of protection. CBR values may also vary from location to location and localised soft/ loose spots require excavating and replacement with a well-compacted granular fill. The subgrade should be thoroughly proof rolled prior to construction, and it is recommended that it is inspected by an experienced geotechnical engineer.

The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-2 and AC-2 for Made Ground, and DS-1 and AC-1 for Glacial Till.

11.2 Ground Contamination

A revised tabulated revised Conceptual Site Model has derived the following findings on the Generic Quantitative Risk Assessment risk assessment and is presented in *Section 9.0*.

A **Low** risk rating is identified to site end-users, and a **Moderate/Low** risk rating identified to construction workers from contamination in soils from direct contact, dermal uptake, soil and dust ingestion and inhalation with Made Ground soils. No exceedances of 'Commercial' GACs were recorded furthermore no visual or olfactory evidence of contamination was recorded during the ground investigation. Asbestos was not identified onsite or during laboratory analysis. The proposed development building footprint and hardstanding will break the source-pathway-receptor linkage to site end users. Construction workers should be provided with appropriate PPE and sanitary facilities with respect to the environmental testing results enclosed herein.

11.3 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

1. Construction workers to be provided with appropriate PPE and sanitary facilities during groundworks and construction works.
2. Obtain and review as-built drawings for appreciation of foundations and bearing capacity.
3. Further works including bearing capacity and settlement may be required if existing loads are increasing as part of the refurbishment. Additional loads would need to be quantified to allow further assessment.
4. For any new hardstanding a preliminary design CBR of 5% would be assumed. CBRs presented within this report are only preliminary and further testing must be undertaken for confirmation.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 12) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements.

12 REFERENCES

1. **Curtins** (2025) Whitefield Medical Centre, Phase 1 Preliminary Risk Assessment, Ref. 087132-CUR-XX-XX-T-GE-00002-P01
2. **UK Maps of Radon** [online] [UKradon - UK maps of radon](#) (accessed July 2025).
3. **ICE UK** (2022) Specification for Ground Investigation, Third Edition.
4. **British Standards Institution** (2006) Eurocode 7: Geotechnical Design (report no. BSEN1997).
5. **British Standards Institution** (2015+2020) Code of Practice for Site Investigations (report no. BS5930).
6. **British Standard** (2016) Methods of test for soils for civil engineering purposes. General requirements and sample preparation (report no. BS1377-1).
7. **NHBC Standards** (2023) Part 4 Foundations: Chapter 4.2.4.
8. **Stroud, M. a. B. F.** (1975) The Standard Penetration Test and the Engineering Properties of Glacial Materials.
9. **British Standards Institution** (2015) Code of Practice for Foundations (Report No. BS8004).
10. **Peck, Hanson and Thornburn** (1947) Foundation Engineering, 2nd Edition
11. **Building Research Establishment** (2005) Special Digest 1: Concrete in Aggressive Ground.
12. **Health and Safety Executive** (2015) Construction (Design and Management) Regulations
13. **Environment Agency**, 2004. CLR11 Procedures for the Management of Land Contamination, Contaminated Land Report 11.
14. **CIRIA C552** (2001) Contaminated Land Risk Assessment: A Guide to Good Practice.
15. **CITB** (2015) Construction (Design and Management) Regulations

13 APPENDICES

Appendix A – Drawings

Appendix B – Exploratory Hole Logs

Appendix C – Foundation Pit Log

Appendix D – Chemical Laboratory Test Results

Appendix E – Geotechnical Laboratory Test Results and CBR Results

Appendix F – Groundwater Monitoring Results

Appendix G – GAC Screening Thresholds

Appendix H – Risk Assessment Methodology

Appendix A – Drawings



- Exploratory Holes
- Hand Excavated Pit
 - TRL Probe for CBR
 - Window Samples
 - Approximate Red Line Site Boundary

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Status	INFORMATION			
Project:				
Whitefield Library				
Drg Title:				
Exploratory Hole Location Plan				
Scale: NTS	Size: A3	Issue Date: 29/05/2025	Drawn: RBJ	Checked: NF
Drg No:				Rev:
087132-CUR-00-XX-DR-GE-80001				P02
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- Exploratory Holes
- Hand Excavated Pit
 - TRL Probe for CBR
 - Window Samples
 - Approximate Red Line Site Boundary

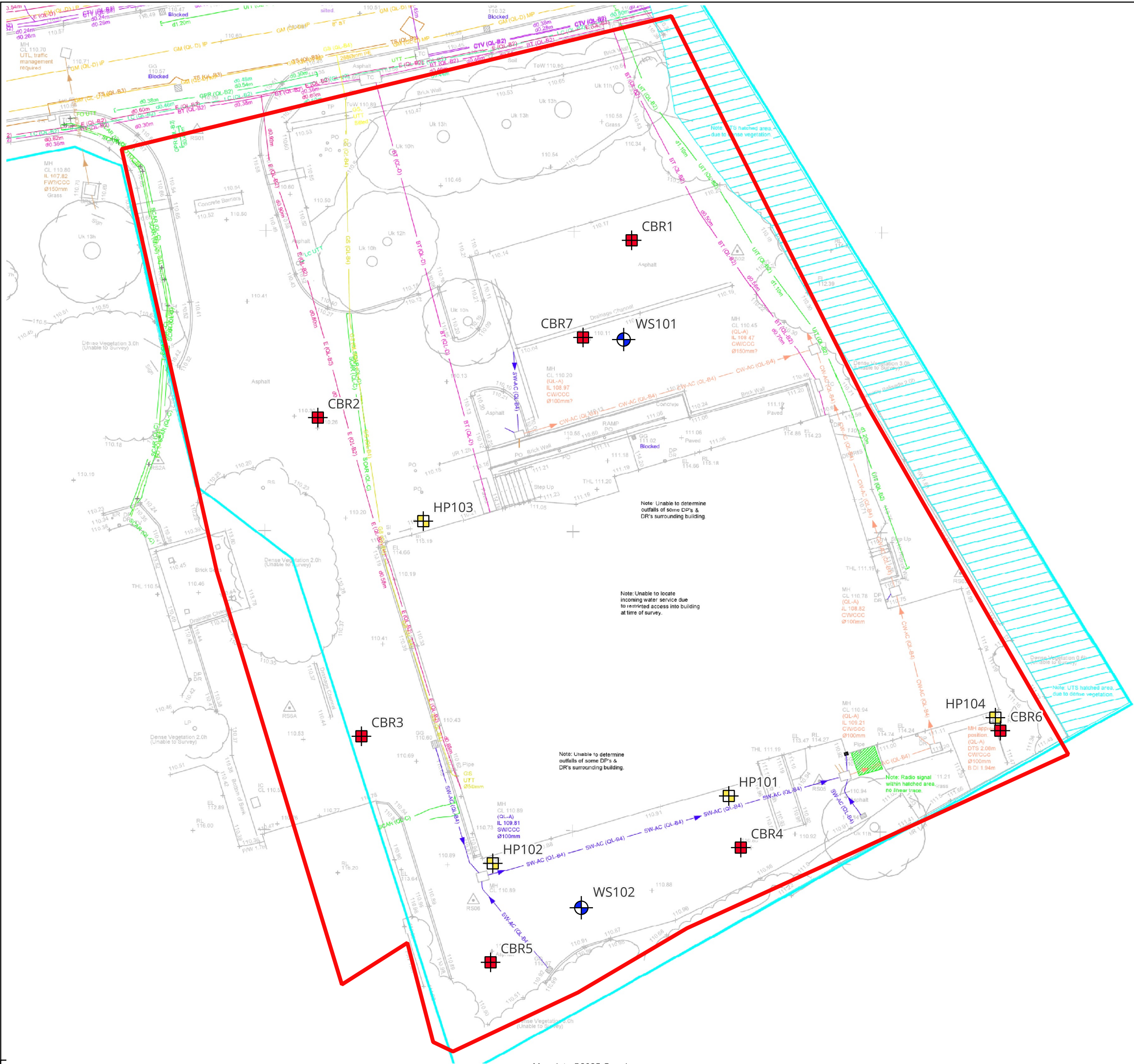
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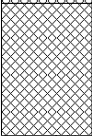
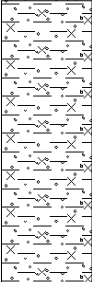
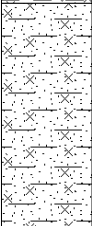
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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status	INFORMATION			
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Drg Title:	Exploratory Hole Location Plan			
Scale:	NTS	Size: A3	Issue Date: 30/07/2025	Drawn: RBJ
				Checked: NF
Drg No:	087132-CUR-00-XX-DR-GE-80002			Rev: P02

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Appendix B – Exploratory Hole Logs

Curtins				Borehole Log				Borehole No. WS101 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords:		Hole Type Window Sampler		
Location: Manchester						Level: 110.20 m		Scale 1:40		
Client: NHS Property Ltd						Dates: 22/05/2025 - 22/05/2025		Logged By RBJ		
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.35	ES	N=2 (1,1/0,1,0,1)	0.24	109.96		MADE GROUND: Dark grey tarmac with a gravel of tarmac sub-base.	1	
					0.60	109.60		MADE GROUND: Brown very sandy gravel with frequent cobbles. Gravel is medium to coarse and angular to sub-rounded of brick, concrete, sandstone, ceramic and plastic. Cobbles of brick and concrete. <i>At 0.24m bgl a brown membrane was identified.</i>		
		1.00	SPT		1.30	108.90		MADE GROUND: Black soft gravelly clay. Gravel is angular to sub-angular and medium to coarse of brick and sandstone with rare timber fragments.		
		2.00 2.10	SPT D	N=10 (1,0/0,2,4,4)				Soft dark brown slightly gravelly silt CLAY. Occasional gravel of wood fragments. <i>From 1.40 to 1.90m bgl slight organic odour wwith a brown silty soft clay with organic material of frequent wood.</i>	2	
		3.00 - 4.00 3.00	B SPT	N=13 (1,1/2,3,4,4)	2.80	107.40		Light brown silty clayey fine to medium SAND.	3	
		4.00	SPT	N=14 (1,2/2,3,3,6)	4.00	106.20		Firm brown gravelly CLAY. Gravel is medium to coarse and sub-rounded of sandstone and coal fragments.	4	
					4.45	105.75		End of Borehole at 4.45 m	5	
										6
										7
										8
Remarks: Service inspection pit hand excavated from GL to 1.00m. Groundwater strike encountered at 3.80m bgl. Borehole collapsed from 4.00m bgl to 2.00m bgl, redrilled to 4.00m bgl. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).										

Curtins				Borehole Log				Borehole No. WS102 Sheet 1 of 1	
Project Name: Whitefield Library				Project No. 087132		Co-ords:		Hole Type Window Sampler	
Location: Manchester						Level: 110.90 m		Scale 1:40	
Client: NHS Property Ltd						Dates: 22/05/2025 - 22/05/2025		Logged By RBJ	
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.02			0.02	110.88		MADE GROUND: Dark grey tarmac.	
		0.18			0.18	110.72			
		0.25	ES					Firm brown mottled grey slightly sandy gravelly CLAY (Reworked?). Gravel was fine to coarse and sub-angular to sub-rounded of sandstone and coal fragments.	
		1.00	SPT	N=8 (1,1/2,2,2,2)	1.00	109.90			
		1.50	D					At 1.40m bgl a 1cm coarse sand band is recorded.	
		2.00	SPT	N=10 (1,1/2,2,3,3)					
		2.50	D						
		3.00 - 4.00	B SPT	N=13 (1,2/2,3,4,4)	3.00	107.90			
		3.00							
		4.00	SPT	N=17 (3,3/4,4,4,5)					
						4.45	106.45	End of Borehole at 4.45 m	
Remarks: Service inspection pit hand excavated from GL to 1.00m. Groundwater strike encountered at 3.00 bgl. Wet material from 3.00 to 4.00m bgl. Borehole collapsed at 4.00m bgl to 3.00m bgl, redrilled to 4.00m bgl then collapsed again to 3.50m bgl. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).									
									

Curtins				Trial Pit Log			Trialpit No HP101 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords: - Level: 110.96		Date 22/05/2025	
Location: Manchester				Dimensions (m): Depth 0.92			Scale 1:20		
Client: NHS Property Ltd							Logged RBJ		
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.15	ES		0.06	110.90		MADE GROUND: Dark grey tarmac.		
				0.14	110.82		MADE GROUND: Sub-base of dark grey tarmac gravel.		
				0.17	110.79		MADE GROUND: Light grey gravel of medium sub-angular limestone.		
				0.25	110.71		MADE GROUND: Brownish red whole bricks.		
									
				0.92	110.04		End of pit at 0.92 m		
Remarks: Building foundation encountered from 0.65-0.90m bgl. Refer to drawing HP101. No groundwater encountered. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).				1 2 3 4					
Stability:									



Curtins				Trial Pit Log			Trialpit No HP102 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords: - Level: 110.90		Date 22/05/2025	
Location: Manchester				Dimensions (m): Depth 0.26			Scale 1:20		
Client: NHS Property Ltd							Logged RBJ		
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
			0.02	110.88		MADE GROUND: Dark grey tarmac.			
			0.05	110.86		MADE GROUND: Light grey gravel of medium sub-angular limestone.			
			0.12	110.78		MADE GROUND: Light grey concrete.			
			0.26	110.64		MADE GROUND: Dark grey concrete with rebar. <i>Rebar 1cm thick.</i>			
								End of pit at 0.26 m	
								1	
								2	
								3	
								4	
Remarks: No building foundation identified within foundation handpit. Refer to drawing HP102. Handpit terminated at 0.26m bgl due to unable to extend pit as utility service in close proximity. No Groundwater encountered. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).									
Stability:									



Date
22/05/2025

Scale
1:20

Logged
RBJ

1
2
3
4



Curtins				Trial Pit Log			Trialpit No HP104 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords: - Level: 111.16		Date 23/05/2025	
Location: Manchester				Dimensions (m): Depth 1.20				Scale 1:20	
Client: NHS Property Ltd								Logged RBJ	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.12	ES		0.05	111.11		MADE GROUND: Concrete flag. MADE GROUND: Sub-base of light brown/grey tarmac gravel. Gravel is fine to medium and sub-angular to rounded of sandstone and limestone. MADE GROUND: Black sandy gravel. Gravel is angular to sub-rounded and medium to coarse of brick, sandstone and mixed lithology. MADE GROUND: Light grey sandy gravel with occasional cobbles. Gravel is medium to coarse of concrete. Cobbles of sub-angular concrete. Firm brown mottled grey slightly sandy gravelly CLAY (Reworked?). Gravel was fine to coarse and sub-angular to sub-rounded of sandstone and coal fragments.		
				0.09	111.07				
				0.20	110.96				
				0.60	110.56				
				1.20	109.96				
							End of pit at 1.20 m		
Remarks: No building foundation identified within foundation handpit. Refer to drawing HP104. Handpit terminated at 1.20m bgl. Handpit probed to 1.50m bgl but no foundation encountered. No groundwater encountered. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).									
Stability:									



Project Name: Whitefield Library

Project No.
087132

Co-ords: -
Level: 110.17

Date
23/05/2025

Location: Manchester

Dimensions
(m):

Scale
1:20

Client: NHS Property Ltd

Depth
0.22

Logged
RBJ

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.07	110.10		MADE GROUND: Dark grey tarmac.
				0.10	110.07		MADE GROUND: Sub-base dark grey gravel of coarse tarmac.
				0.22	109.95		MADE GROUND: Black gravel fine to medium and angular to sub-rounded clinker, ash, brick and wood fragments.
				End of pit at 0.22 m			
							1
							2
							3
							4

Remarks:	Surface hardstanding cored and subbase removed before TRL Probe started. Refer to CBR value for CBR1. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).
----------	--

Stability:



Curtins				Trial Pit Log			Trialpit No CBR2 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords: - Level: 110.26		Date 23/05/2025	
Location: Manchester				Client: NHS Property Ltd		Dimensions (m): Depth 0.24		Scale 1:20	
		Logged RBJ							
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.11	110.15		MADE GROUND: Dark grey tarmac.		
				0.24	110.02		MADE GROUND: Brown very sandy gravel. Gravel is medium to coarse and angular to sub-rounded of brick, concrete and sandstone.		
							End of pit at 0.24 m		
							1		
							2		
							3		
							4		
Remarks: Surface hardstanding cored and subbase removed before TRL Probe started. Refer to CBR value for CBR2. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).									
Stability:									



Project Name: Whitefield Library

Project No.
087132

Co-ords:	-
Level:	110.88

Date
23/05/2025

Location: Manchester

Dimensions
(m):

Scale
1:20

Client: NHS Property Ltd

Depth
0.16

Logged
RBJ

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.11	110.77		MADE GROUND: Dark grey tarmac.
				0.17	110.71		MADE GROUND: Sub-base dark grey gravel of medium to coarse and sub-angular to sub-rounded tarmac and sandstone.
							End of pit at 0.16 m

Remarks:	Surface hardstanding cored and subbase removed before TRL Probe started. Refer to CBR value for CBR4. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).
----------	--

Stability:



Project Name: Whitefield Library

Project No.
087132

Co-ords:	-
Level:	110.89

Date
23/05/2025

Location: Manchester

Dimensions
(m):

Scale
1:20

Client: NHS Property Ltd

Depth
0.22

Logged
RBJ

[illegible]

Remarks:	Surface hardstanding cored and subbase removed before TRL Probe started. Refer to CBR value for CBR5. Ground Level estimated from topographical survey (drawing ref. 72968NGUD-01 by Survey Solutions dated May 2025).
----------	--

Stability:

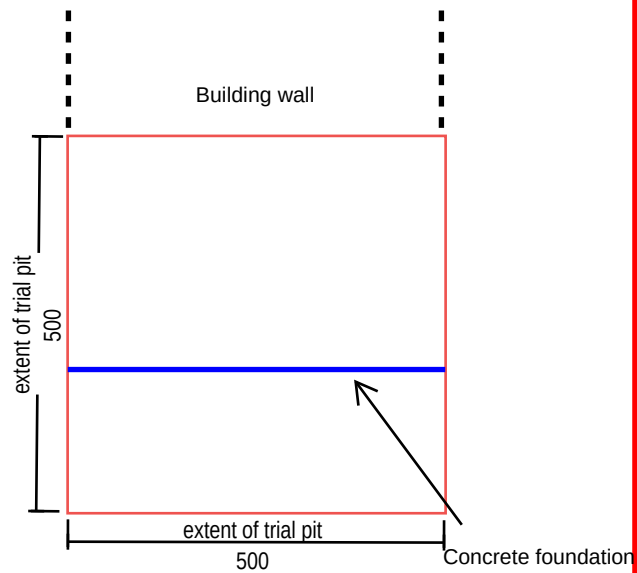


Curtins				Trial Pit Log			Trialpit No CBR7 Sheet 1 of 1		
Project Name: Whitefield Library				Project No. 087132		Co-ords: - Level: 110.11		Date 23/05/2025	
Location: Manchester				Dimensions (m): Depth 0.18			Scale 1:20		
Client: NHS Property Ltd							Logged RBJ		
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	110.06		MADE GROUND: Dark grey tarmac.		
				0.16	109.95		MADE GROUND: Sub-base dark grey gravel of coarse tarmac.		
				0.18	109.93		MADE GROUND: Blackish brown soft silty gravelly clay. Gravel fine to medium and angular to sub-rounded clinker and brick.		
							End of pit at 0.18 m		
								1	
								2	
								3	
								4	
Remarks: Surface hardstanding cored and subbase removed before TRL Probe started. Refer to CBR value for CBR7. Ground Level estimated from topographical survey (drawing ref. 72968NGUG-01 by Survey Solutions dated May 2025).									
Stability:									

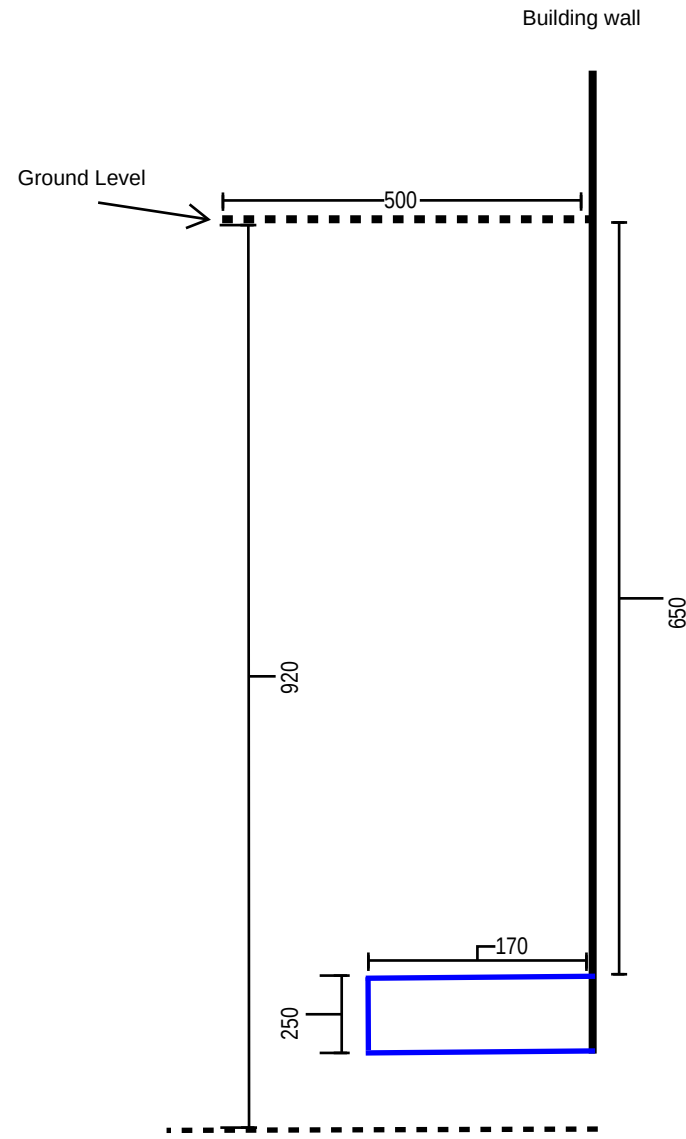


Appendix C – Foundation Pit Log

HP101
Plan View



HP101
Cross Section



Cross-sections to be read in conjunction with the foundation pit logs and photographic log.

All measurements in mm unless stated otherwise.

P01 For Review 04/06/25 RBJ NF

Rev:	Description:	Date:	By:	Chkd:



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Birmingham - Bristol - Cardiff - Douglas - Edinburgh - Kendal - Leeds - Liverpool - London - Manchester - Nottingham

Status:

INFORMATION

Project:

Whitefield Library

Drg Title:

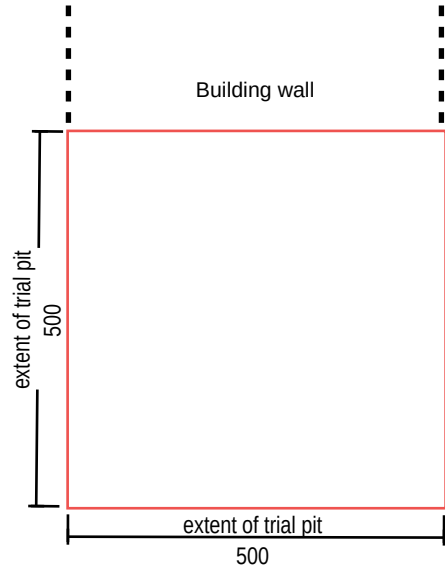
Foundation Hand Pit Drawings

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	02/04/2025	RBJ	NF

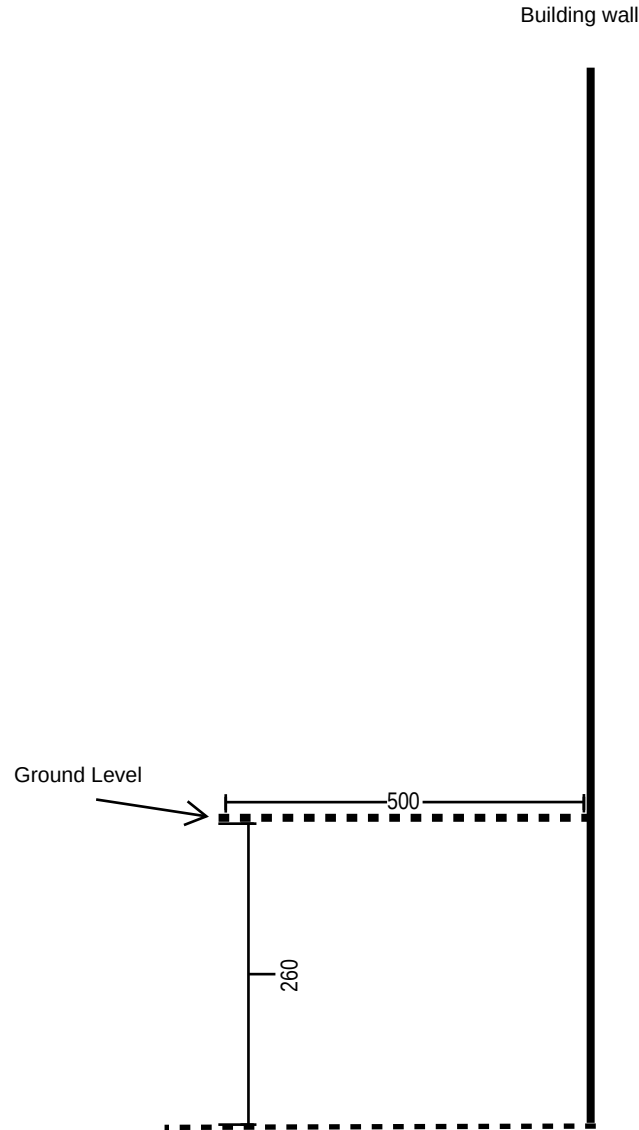
Drg No:	Rev:
085473-CUR-XX-XX-D-GE-00006	P01

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HP102
Plan View



HP102
Cross Section



Cross-sections to be read in conjunction with the foundation pit logs and photographic log.

All measurements in mm unless stated otherwise.

P01 For Review 04/06/25 RBJ NF

Rev:	Description:	Date:	By:	Chkd:

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Status:

INFORMATION

Project:

Whitefield Library

Drg Title:

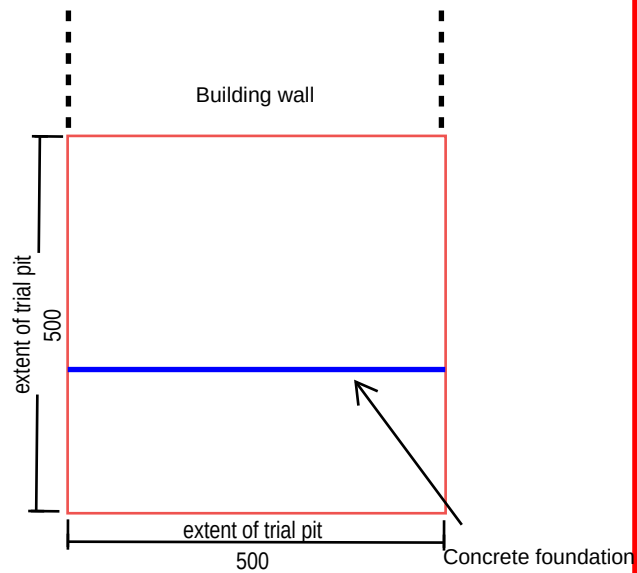
Foundation Hand Pit Drawings

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	02/04/2025	RBJ	NF

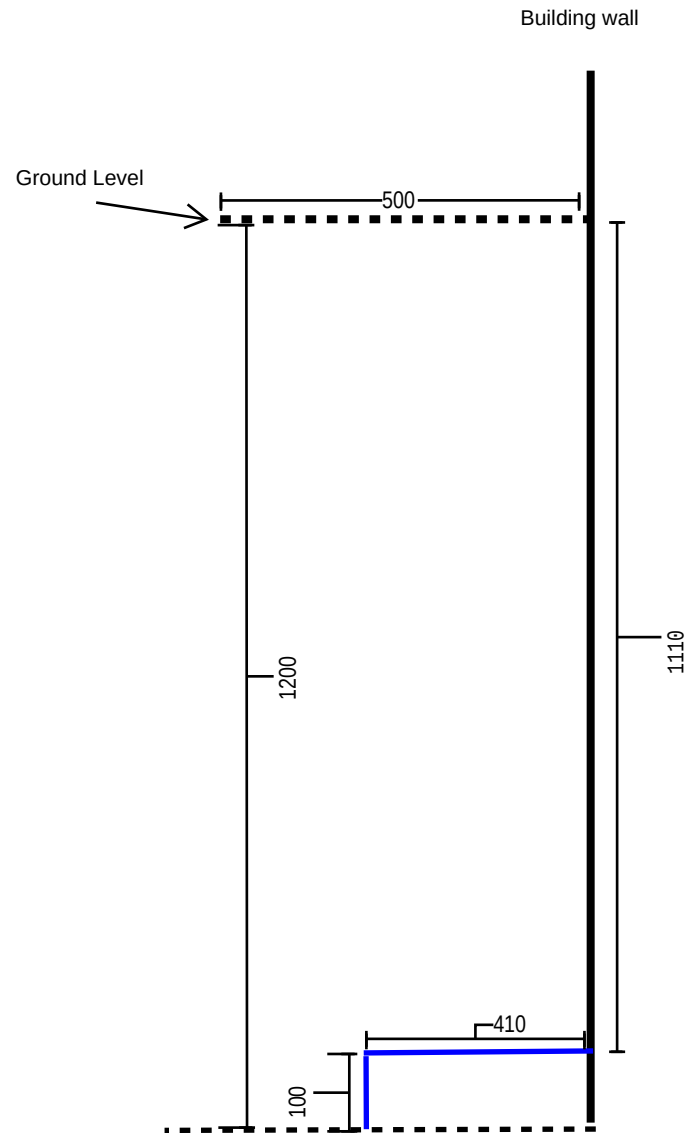
Drg No:	Rev:
085473-CUR-XX-XX-D-GE-00006	P01

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HP103
Plan View



HP103
Cross Section



Cross-sections to be read in conjunction with the foundation pit logs and photographic log.

All measurements in mm unless stated otherwise.

P01 For Review 04/06/25 RBJ NF

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Status:

INFORMATION

Project:

Whitefield Library

Drg Title:

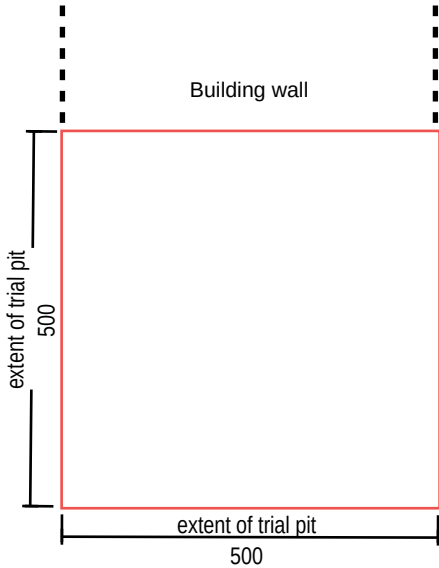
Foundation Hand Pit Drawings

Scale:	Size:	First Issue:	Drawn:	Checked:
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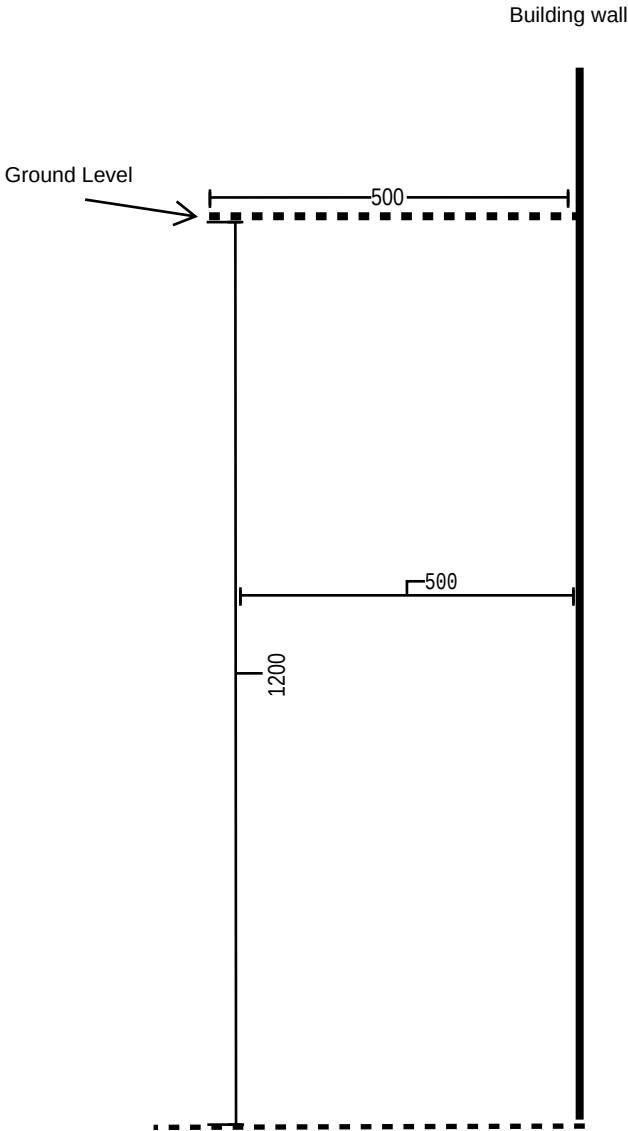
Drg No:	Rev:
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HP104
Plan View



HP104
Cross Section



Cross-sections to be read in conjunction with the foundation pit logs and photographic log.

All measurements in mm unless stated otherwise.

P01 For Review 04/06/25 RBJ NF

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Status:

INFORMATION

Project:

Whitefield Library

Drg Title:

Foundation Hand Pit Drawings

Scale: NTS	Size: A3	First Issue: 02/04/2025	Drawn: RBJ	Checked: NF
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Drg No: 085473-CUR-XX-XX-D-GE-00006	Rev: P01
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Appendix D – Chemical Laboratory Test Results