

NHA/M4246/12346

The Dean Trust

08 September 2023

The Dean Trust

Cecil Avenue

Sale

Cheshire

M33 5BP

For the Attention of Mr A James

Dear Andy,

Re: Dean Trust Academy, Ardwick – Proposed Fitness Suite

Overview

Background & Proposed Development

BSL has had extensive involvement in assisting the Dean Trust through their contaminated land planning conditions since the school which was built in 2015 began to be extended in 2019 to facilitate its growing needs.

In 2019 a planning application was submitted for a new two storey extension and undercroft car parking, a single storey dining extension, and the removal of earth bunds for construction of new surface level car park and hard surfaced play areas. These have since been constructed at the site, and the school now proposes to construct a new fitness suite under the recently constructed classroom extension, in the area of the undercroft parking as shown on drawing ref. 5627-HMA-DTA-00-DR-A-00003 and 5627-HMA-00-00-DR-A-20101 appended. It is also proposed to build two covered cycle parking bays which is demonstrated on the proposed landscaping and fencing plan ref. 5627-HMA-DTA-00-DR-A-20105. No areas of soft landscaping are proposed. Planning for this has been granted in July 2023 (137058/FO/2023).

This letter report has been produced to satisfy the 'site investigation report' element of condition 4a and looks to reassess existing information relevant to the new application.

Previous Reporting – Dean Trust Academy Site

An overview of previous reports is listed below:

Phase 1 Desk Study	- Brownfield Solutions Ltd Report (GP/M4246/8660) issued July 2019. - Atkins Dean Trust Ardwick High School (Revised Scheme) Phase 1: Geo-Environmental Assessment (5130327/DTAHS-RS/002) issued August 2015.	Available Available
Phase 2 / Site Investigation	Atkins Manchester Schools Basic Needs Programme: Daisy Mill Ground Investigation Report (GTG20140378/5130327/19/Rev 0) issued December 2014.	Available

	Geotechnics Limited Factual Report on Ground Investigation issued December 2014.	Not Available
	Atkins Dean Trust Ardwick High School (Revised Scheme) Ground Investigation Report – Contaminated Land Risk Assessment (5130327/09/CLRA/Rev 0) issued August 2015.	Available
	Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015.	Available
	ESG Factual Report (LO/R5141/001/NB) issued October 2015.	Not Available
	ESG Detailed Quantitative Risk Assessment Report (R5141b) issued October 2015.	Not Available
	Solmek Phase 2 Site Investigation Report (S160937/SI) issued November 2016.	Available
	Brownfield Solutions Ltd Phase II Geo-Environmental Assessment Report (NS/M4246/8662 Rev B) issued October 2019.	Available
Remediation / Validation	- Atkins Manchester Schools Programme: Dean Trust Ardwick Remediation Strategy (5119532_1) issued June 2015. - ESG Remediation Strategy (R5141/2) issued October 2015. - ESG Remediation Verification Report (R5141/3) issued December 2016. - Brownfield Solutions Ltd Remedial Strategy (NS/M4246/8855 Rev A) issued November 2020. - Brownfield Solutions Ltd Clean Cover System Validation (NS/M4246/9858) issued January 2021.	Available Not Available Available Available Available
Other	- ESG Materials Management Plan Dean Trust Ardwick 2016 (R5141/MMP) issued December 2015. - Zetica Site Safe UXO Desk Study (P5220-15-R1-A) issued April 2015. - Brownfield Solutions Ltd Phase II Geo-Environmental Assessment Report (NS/M4246/8662 Rev B) issued October 2019.	Available Available Available

Atkins Ground Investigation Report (2014)

A summary of the relevant points from the Ground Investigation Report (ref. GTG20140378/5130327/19/Rev 0, dated December 2014) completed by Atkins is presented below:

- 7 No. cable percussive boreholes (BH1 to BH6) to a maximum depth of 21.45m bgl.
- 8 No. window samples boreholes (WS01 to WS08) to depths of between 0.30m and 6.45m bgl.
- 4 No. trial pits (TP01 to TP04) to depths of between 2.30m and 2.90m bgl.
- Ground conditions encountered included topsoil up 0.60m in thickness, granular made ground to depths of between 0.30m and 3.60m bgl, cohesive made ground to depths of between 1.00m and 4.80m bgl. Made ground was underlain by glacial till to between 17.60m and 20.32m bgl underlain by weathered sandstone/mudstone to a maximum proven depth of 21.45m bgl. Peat was recorded in BH03 at a depth of 2.50 to 2.90m bgl.
- Groundwater strikes were encountered in exploratory holes BH02A, BH03, BH05, WS01, WS02 and WS05 and WS02 at depths ranging between 0.90m and 19.70m bgl.
- 12 No. undrained triaxial tests were undertaken in the glacial till and results ranging from 118kPa to 457kPa were recorded at depths of between 3.00m and 16.50m bgl.
- 12 No. bulk density tests in the glacial till recorded results ranging between 2.06Mg/m³ and 2.29Mg/m³.
- Undrained shear strength in the glacial till ranged between 25kPa and 457kPa with an average of 163kPa.
- The Design Sulphate Class for the site is DS-1 and the ACEC Class is AC-1.

Zetica UXO Desk Study (2015)

A summary of the relevant points from the Sitesafe UXO Desk Study (ref. P5220-15-R1-A, dated April 2015) completed by Zetica is presented below:

- There is no evidence that the Site was bombed and no other significant sources of UXO have been identified on the Site. It is considered that the Site has a low UXO hazard level.

Atkins Contaminated Land Risk Assessment (2015)

A summary of the relevant points from the Ground Investigation Report – Contaminated Land Risk Assessment report (ref. 5130327/09/CLRA/Rev 0.0, dated August 2015) completed by Atkins is presented below:

- 47 No. soil samples analysed for a range of determinands including heavy metals, PAHs, TPH CWG, BTEX, PCBs, phenols, moisture content, sulphate, soil organic matter, cyanide and pH.
- 13 No. soil samples analysed for asbestos ID.
- 16 No. soil samples analysed for soil leachate analysis (2:1 dilution).
- 16 No. groundwater samples analysed for metals, PAHs, TPH CWG, BTEX, sulphate cyanide and pH.
- 5 No. soil samples analysed for WAC Analysis.
- Visual and olfactory evidence of contamination was identified within the made ground across much of the site noted to be ash and localised tarmacadam fragments. Hydrocarbon odours were noted in BH01 at 0.30-1.00m bgl, BH06 3.40-4.80m bgl.
- Soil Vapour Headspace Monitoring revealed elevated readings in BH01 at 0.50m bgl (37.0ppm), BH02A at 3.50m bgl (201.0m bgl) and 3.40m bgl (28.3ppm).
- The combined soil sample analysis results for the Sub-Surface and ASL site investigations were compared against relevant assessment criteria including CLEA derived GACs resulted in the following exceedances:

Contaminant	Max Concentration (mg/kg)	Number of samples	Screening Value (mg/kg)
Lead	508	42 (8)	310
Benzo(a)anthracene	30.67	47 (9)	9.04
Benzo(a)pyrene	33.43	47 (20)	1.04
Indeno(123cd)pyrene	19.85	47 (5)	10.3
Dibenzo(ah)anthracene	4.35	47 (9)	1.03
Benzo(b)fluoranthene	36	47 (9)	10.3
TPH Aro. >C10-C12	1993.4	47 (1)	1080
TPH Aro. >C12-C16	7030	47 (1)	2040
TPH Aro. >C16-C21	17721	47 (1)	1330
TPH Aro. >C21-C35	15179	47 (1)	1300

NB: Number in brackets represents the number of results above guideline values.

- In addition to the above the following samples recorded asbestos:

Location	Depth (m)	Asbestos ID	Asbestos Level	Asbestos Level (%)
TP01	1.00-1.20	Chrysotile free fibres	Quantifiable	<0.001
TP01	1.90-2.00	Chrysotile free fibres	Quantifiable	<0.001
TP02	0.50	Chrysotile free fibres	Quantifiable	0.002
WS03A	0.50	Chrysotile free fibres	Trace	-
WS05	0.25	Chrysotile free fibres	Trace	-
WS05	0.90	Chrysotile free fibres	Quantifiable	0.031
BH06	1.00	Amosite free fibres	Quantifiable	<0.001
BH06	2.00	Chrysotile free fibres	Quantifiable	<0.001
BH06	3.40	Chrysotile free fibres	Trace	-
BH06	4.00	Chrysotile free fibres	Quantifiable	0.005
BH01	0.50	Chrysotile free fibres	Quantifiable	<0.001

BH02	1.20-1.65	Chrysotile cement present and Free Fibres in soil	Quantifiable	0.573
BH02A	0.70	Chrysotile free fibres	Quantifiable	0.055
BH02A	2.90	Chrysotile free fibres	Quantifiable	<0.001
BH02A	3.50	Chrysotile free fibres	Trace	-

- Elevated concentrations of antimony, chromium, copy, iron, manganese, zinc, naphthalene, anthracene, fluoranthene, benzo(a)pyrene, Σ (benzo(b)fluoranthene + benzo(k)fluoranthene), Σ (benzo(ghi)perylene + indeno(123cd)pyrene), Σ (benzo(b)fluoranthene + benzo(k)fluoranthene + benzo(ghi)perylene + indeno(123-cd)pyrene) were recorded in leachate samples taken from across the site.
- Elevated concentrations of cadmium, copper, selenium, zinc, fluoranthene, benzo(a)pyrene, TPH Ali. >C16-C21, TPH Ali. >C21-C35, Total TPH Ali. C12-C35, TPH Aro. >C21-35, Total TPH Aro. C12-C35, TPH and sulphate were recorded in a number of sample locations across the site in the first monitoring visit. The second visit recorded elevated heavy metals.
- Despite some of the exceedances for TPHs, PAHs and heavy metals it is considered that the distances from site to the surface water receptors in the vicinity of the site, is that there is not a sufficient pathway to exist and that the distance would allow attenuation to result in insignificant concentrations at the receptor and therefore present a low potential risk.
- Groundwater encountered is considered to be perched and not reflective of the groundwater within the underlying Principal Aquifer within the underlying Principal Aquifer (Chester Pebble Beds) or Secondary B Aquifer (Manchester Marls) within the bedrock.
- Gas monitoring recorded elevated carbon dioxide concentrations in BH02A and BH03 in the northern half of the site. A peak flow of 10.5l/hr was recorded in BH03. Given this, this area of the site was classified as CS2 and gas protection measures were recommended.
- A moderate risk was considered to exist to human health from the made ground, however, the implementation of an environmental cover system was considered to reduce the risk to moderate/low.
- A moderate/low risk was considered to exist to human health and property as a results of ground gas, however, the implementation of gas protection measures was considered to reduce the risk to low.
- A very low risk was considered to exist to surface water receptors and a low risk was suggested for the risk of contaminated made ground to the Principal and Secondary 'B' Aquifers.

Atkins Remediation Strategy (2015)

A summary of the relevant points from the Remediation Strategy Report (ref. 5119532_1, dated June 2015) completed by Atkins is presented below:

- Assessment of gas monitoring data, outlined above, suggest the concentrations of soils gases across the site to be representative of a Characteristic Situation 2 (CS2) in accordance with CIRIA C665 (Ref 18).
- Sites falling within CS2 are recommended to implement the following protection methods into buildings constructed in the area:
 - a. Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200g DPM.
 - b. Beam and block or precast concrete slab and minimum 2000 g DPM/reinforced gas membrane.
 - c. Possibly underfloor venting or pressurisation in combination with a) and b) depending on use.
- All joints and `penetrations are to be sealed.
- An environmental cover system is required to break the barrier between the contaminated site soils and the end-user. The cover system should comprise a minimum 150mm compacted clay or subsoil. Above the compacted layer will be a 450mm of a lower layer compacted alleviated subsoil and a minimum of 300mm of topsoil.
- Topsoil shall be imported from a topsoil supplier and tested at a rate of 1 sample per 500m³ per source of material. All soils shall be free of asbestos and other deleterious and or contaminated materials.
- Where site won topsoil is proposed for reuse on site for landscaping purposes, it shall be tested to BS 3882 2007 to ensure it is suitable. Any materials failing to meet the specification shall be removed to a segregation area and isolated from other stockpiles. The material will then be disposed of off-site to the appropriate licensed facilities.

Solmek Phase 2 Site Investigation Report (2016)

A summary of the relevant points from the Phase 2 Site Investigation Report (ref. S160937/SI, dated November 2016) completed by Solmek Ltd is presented below:

- 4 No. window sample boreholes (BH1 to BH4) drilled to a depth of 5.00m bgl.
 - 3 No. ground gas and water monitoring installations installed within BH2, BH3 and BH4.
 - Made ground was generally encountered as dark brown clayey slightly gravelly sandy topsoil, proven to max 0.50mbgl (BH4) underlain by blackish brown slightly sandy to sandy slightly gravelly clay with brick fragments, proven to a max 1.80mbgl (BH2). Within BH1 to BH3 the above stratum was underlain by stiff consistency dark brown slightly sandy slightly gravelly clay with rare brick fragments proven to max 3.00mbgl (BH2).
 - Natural deposits were generally proven as stiff consistency dark brown slightly sandy to sandy slightly gravelly high strength clay of intermediate to high plasticity to a depth of 5.00mbgl.
 - Groundwater was not encountered within any of the exploratory borehole positions.
 - 3 No. samples of made ground were tested for metals, semi-metals, non-metals, inorganic determinants and Asbestos identification screening.
 - 2 No. samples were tested for PAHs and TPH CWG.
 - All metals, inorganic and organic determinants were found to be below the relevant thresholds.
 - Slightly alkaline pH conditions in made ground, with soluble sulphates below the BRE Special Digest One threshold value of 500mg/l.
 - No positive identification of asbestos was made in the samples screened.
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ESG Remediation Verification Report (2016)

A summary of the relevant points from the Remediation Verification Report (ref. R5141/3, dated December 2016) completed by ESG is presented below:

- The amosite asbestos contamination within the existing Made Ground soils could pose a potential risk to site users within areas of soft landscaping and grass pitches. The Remediation Strategy required that these areas should comprise the installation of a clean cover system, incorporating a minimum of 300mm imported and validated 'clean' soils as agreed between LO'R and Manchester City Council. The clean cover soils should be underlain by a geotextile marker layer to clearly delineate the underlying potentially contaminated soils with the clean imported soils.
 - The clean cover system should incorporate a minimum of 150mm of topsoil at the upper limit of the system, conforming to the requirements of the acceptance criteria and the British Standard BS 3882:2015 Specification for Topsoil (multipurpose topsoil).
 - A slight design change to the above specification of clean cover in the grassed football pitch was proposed by LO'R during the works and this was agreed by MCC. The amended clean cover system in the grassed pitch area comprised 100 mm of porous / permeable granular imported sub-base, with only a single (not two as originally specified) geotextile membrane placed between the topsoil and porous granular drainage layer, and 200 mm of topsoil. Multitrack 1000 geotextile membrane was used in the grassed pitch areas and Terram 1000 in the soft landscaping areas.
 - Approximately 6850 tonnes (3500m³) of topsoil was imported to site in total (1020 tonnes from the Sandbach site, and 5830 tonnes from the Freeland/Astley/Leigh Lane site).
 - Following review of the chemical results of the analysis of 35 samples (20 from Freeland Astley/Leigh Lane and 15 from Sandbach) of topsoil samples from the above sources (provided by the groundwork's contractor supplier), visual observations made during the validation visits carried out by ESG in July and August 2016 and subsequent independent chemical laboratory analysis undertaken by ESG on a total of four topsoil samples collected in July and August September 2016, it has been confirmed that the imported / placed topsoil conformed to the requirements of the acceptance criteria detailed in Table 4 below, and in general confirm to the British Standard 3882: 2015 Specification for Topsoil (multipurpose topsoil).
 - 26No. hand dug depth validation pits were undertaken revealing topsoil depths of between 190mm and 500mm.
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- Validation of the gas membrane installation was undertaken by MEC Environmental Ltd. 3 visits were undertaken and was reported to be good quality. A completion certificate was also provided by PAGED Contracting to certify that the works had been completed in accordance with their specification of works and method statement and that any variations have been agreed and recorded.
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Previous Reporting – 2019 School Extension Planning Application

A summary of the previous reports undertaken for the school extension in 2019 where the proposed fitness suite lies within the footprint.

BSL Phase I Desk Study Assessment (2019)

A summary of the relevant points from the Phase I Desk Study Assessment Report (ref. GP/M4246/8660, dated July 2019) completed by BSL is presented below. The BSL Desk Study was undertaken in relation to proposed two storey extensions and an undercroft car park, single story dining extension and removal of earth bunds.

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- The site consisted of open fields with ponds in the north, and a small row of residential terraces in the south. By 1890 the ponds had likely been infilled and the whole site had been developed into residences and Daisy Mill. Industrial works replaced the depot by 1922, with various industries including Manchester Carriage & Tramway Company Depot, Brewery, Laundry and wash house occupying the site then until at least 2010. By 2014 the last of the works had been demolished and replaced with the education facility that continues to occupy the site today.
 - From the information obtained during the desk study numerous potentially contaminative site uses have occupied the site including the Daisy Works/Mill, depots, brewery, electricity substation, laundry and washhouse. Offsite sources of contamination including a warehouse/garage, an electricity substation, mineral water works, shield works, garage, and joinery works.
 - Geology comprises glacial till (Secondary Undifferentiated Aquifer) comprising clay underlain by the Chester Sandstone Formation (Principal Aquifer), and the Manchester Marl Formation (Secondary B Aquifer) across the north of the site. The site is not indicated to lie within a Source Protection Zone.
 - The site is shown to lie atop the East Manchester Fault, a north-west to south-east trending fault that downthrows to the north-east. However, any movements associated with this fault should now have stopped.
 - The site is in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site could be affected by past or current coal mining. The Coal Authority Report did not identify any coal mining related issues at the site,
 - There are no watercourses within 1000m of the site or any surface water features within 250m of the site.
 - The site is not located in a Zone 2 or Zone 3 floodplain.
 - No radon protection measures are required.
 - The risk to human health is considered to be moderate.
 - The risk to controlled waters is low.
 - The risk from gas is low to moderate.
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BSL Phase II Geo-Environmental Assessment Report (2019)

A summary of the relevant points from the Geo-environmental Assessment Report (ref. (NS/M4246/8662 Rev B) completed by BSL is presented below. The report was undertaken in relation to proposed extensions to the existing development.

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- 7 No. window sample boreholes (WS01 to WS07) drilled to a depth of 5.45m bgl (2No. within the proposed fitness suite footprint).
 - 1. No cable percussive borehole (BH01 and BH01A) drilled to a depth of 8.45m bgl.
 - 1 No. hand-pit to 1.20m bgl.
 - 3 No. ground gas and water monitoring installations installed within WS03, WS04 and WS05.
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- Made ground was encountered within all the exploratory holes across the site and was observed from ground level to depths between 1.00m and >3.90m bgl. Made ground within a large bund in the northeast of the site was noted to comprise brown slightly gravelly slightly sandy clay with brick, clinker, concrete, slate and glass to depths of greater than 3.90m. The natural strata underlying the site was encountered from depths of 1.00m to 3.40m bgl and were generally firm to very stiff clay with varying amounts of silt, sand and gravel as minor constituents proven to 8.45m bgl in BH01A in the north of the site.
- Groundwater was encountered within WS04 at 2.00m bgl.
- Widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location. Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). Chrysotile and amosite fibres were recorded in a sample taken from the bund in the north-east of the site at 0.002%.
- Whilst minor heavy metal and PAH contamination has been identified within the groundwater beneath the site from previous investigations, based on the assessments and updated CSM, BSL believe the overall risk to controlled waters is low and no further action is required.
- Deep made ground was recorded across the site during the works, however, evidence of degradable / putrescible material was localised to WS07 understood to be in proximity to a historic infilled pond. This location is located at greatest distance from the proposed ground floor extension in the north of the site. A round of gas monitoring to confirm the risk did not reveal elevated levels of carbon dioxide or methane. However, gas protection measures in line with CS2 were installed during the construction of the school, therefore in order to stay consistent gas protection measures in line with CS2 (BS8485:2015+A1:2019) will be required with the proposed building extensions.
- Should new areas of soft landscaping be introduced in the proposed works then remediation measures such as an environmental cover system will be required to mitigate the risk. Based on the above, as the gas monitoring programme was limited in duration, gas protection measures in line with CS2 will be required within the proposed building extensions to match the existing measures.

A link to this report is presented in Appendix A.

Summary of Geo-Environmental Risk Assessment Relevant to Planning Application (137058/FO/2023)

General

The previous site investigations have confirmed the following:

- Localised heavy metal, petroleum hydrocarbon, PAH and asbestos (loose fibres) contamination within the made ground.
- Elevated levels of carbon dioxide, VOCs and flow rates recorded during the Atkins site investigation placed the site within CS2 and gas protection measures were required.

Human Health Risks

During the Atkins site investigation (2015) exceedances of lead, PAHs, petroleum hydrocarbons and asbestos fibres were encountered within the made ground across the site. Soil Vapour Headspace Monitoring in BH102A revealed elevated readings of up to 201ppm. Exceedances of lead, benzo(a)pyrene and asbestos fibres were encountered during the investigation by BSL in 2019. Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). During the Atkins investigation, asbestos was identified in soils across the site at concentrations of <0.001% to 0.573% with asbestos cement identified in one location. Therefore, mitigation measures will be required to protect the end-users from the contaminated site soils.

Ground Gas and Vapours

A summary of the ground gas monitoring carried out by BSL and Atkins (2014) is presented below:

- Atkins conducted six groundwater and ground gas monitoring visits between 17th November 2014 and 11th February 2015 from ten exploratory holes.
- Gas monitoring recorded levels of carbon dioxide to a maximum of 9.2% v/v and a maximum flow of 10.5l/hr. Methane was not recorded above the detection limit of 0.1% v/v.
- Soil Vapour Headspace Monitoring revealed elevated readings in BH01 at 0.50m bgl (37.0ppm), BH02A at 3.50m bgl (201.0ppm) and 3.40m bgl (28.3ppm).
- BSL conducted only 1 monitoring visit on 8th July 2019 to confirm the above findings. Gas monitoring recorded levels of carbon dioxide to a maximum of 3.5% v/v and a maximum flow of 0.3l/hr. Methane was not recorded above the detection limit of 0.1% v/v.

On the basis of the above, the site is classified to fall within Characteristic Situation 2 in accordance with CIRIA 665 and therefore mitigation measures are required.

Risk to Controlled Waters

The Atkins site investigation (2015) revealed elevated concentrations of cadmium, copper, selenium, zinc, fluoranthene, benzo(a)pyrene, TPH Ali. >C16-C21, TPH Ali. >C21-C35, Total TPH Ali. C12-C35, TPH Aro. >C21-35, Total TPH Aro. C12-C35, and sulphate were recorded in groundwater from a number of sample locations across the site in the first monitoring visit. The second visit recorded elevated heavy metals. Despite this, there is not a sufficient pathway to exist, and the distances involved would allow attenuation to result in insignificant concentrations at the receptor and therefore present a low potential risk.

Qualitative Risk Assessment

The CSM has been revised based on the findings of the site investigation and laboratory testing results for the red line boundary and these are presented overleaf. Unless stated otherwise, in respect to off-site sources, only risks that are assessed as moderate and above within the preliminary CSM have been carried forward to this section, or where a previously unidentified potential source, pathway and / or receptor has been identified from the recent site works.

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
On site Made Ground Metals, PAHs, asbestos	Root uptake, ingestion, direct contact, inhalation of dusts	End-users	Unlikely	Moderate	Low	Elevated concentrations of lead, benzo(a)pyrene and asbestos were recorded across the site. The proposed development includes a single storey extension in the undercroft area of the previous extension. Given this, the development area will include the presence of hardstanding / building footprint in its entirety which will break the pathway to the site end user, the risk in these areas is low.
On site Made Ground Metals and organic contamination	Migration into/chemical attack of water supply pipelines	Water Pipelines / End users	Low Likelihood	Moderate	Moderate	Heavy metal, PAH, VOC and TPH contamination was recorded during the previous site investigation by Atkins in 2014 and during the recent site works. Contaminants within the soil/groundwater could potentially attack the clean potable water supply pipe, contaminants should be assessed in accordance with the relevant guidance to determine the correct pipe material and level of precautions required.
On site Brewery / Works / Depots Metals, PAHs, Asbestos, TPH etc.	Root uptake, ingestion, direct contact, inhalation of dusts	End-users	Unlikely	Moderate	Low	Elevated concentrations of lead, benzo(a)pyrene and asbestos were recorded across the site. The proposed development includes a single storey extension in the undercroft area of the previous extension. Given this, the development area will include the presence of hardstanding / building footprint in its entirety which will break the pathway to the site end user, the risk in these areas is low.
Made Ground / Infilled Ponds Ground Gas (carbon dioxide and methane)	Migration into confined spaces, inhalation and asphyxiation/ explosion	End-users / property / structures	Unlikely	Severe	Moderate / Low	Made ground encountered was widely sandy clayey gravels / sandy gravelly clay with limited evidence of degradable/putrescible material which is considered to be of low gas generation potential. Significant depths of made ground was also encountered across the site during previous site investigations identified up to 4.80m in thickness. A localised area of organic clay, likely associated with the former pond recorded in this area on historical mapping was encountered within WS07 in the centre of the site. Peat was also identified within borehole BH03 by Atkins in a similar location. The area of organic made ground/peat is located at the greatest distance from the proposed development. Limited gas monitoring undertaken by BSL at the site have not recorded elevated levels of carbon dioxide and methane. However, the Atkins investigation recorded elevated carbon dioxide and flow rates in the centre of the site during monitoring visits, noted to be associated with the peat and made ground. In line with the former remediation strategy, gas protection measures in line with CS2 were implemented at the site. In order to stay consistent across the site, gas protection measures in line with CS2 will be required within the proposed extensions at the site.

Human Health						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Off site Warehouse / Garage / Works / Mills / Electricity Substation PCBs, Metals, PAHs, TPH etc.	Ingestion, direct contact, inhalation of dusts	End-users	Unlikely	Moderate	Low	Offsite sources of contamination are not considered to be greater in significance than those recorded historically at the site. In addition to this, the underlying ground conditions are anticipated to be low permeability glacial till. Given this, lateral migration of contamination onto the site is considered unlikely and therefore the risk is considered to be low.
Controlled Waters						
Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk	Justification
Made Ground / Brewery / Works / Depots PAHs, Metals, TPH	Leaching through unsaturated zone / Migration through saturated zone	Secondary (Undifferentiated) Aquifer (Groundwater)	Unlikely	Medium	Low	Glacial Till is recorded beneath the made ground across the entirety of the site which will break the pathway from the potentially contaminated site soils to the Secondary Undifferentiated Aquifer. Evidence of significant mobile contamination was not recorded during the site works and the site investigation by Atkins in 2014. Localised lead contamination and low level PAH contamination was recorded in a number of the soil samples. Contamination recorded within the groundwater samples during the Atkins investigation was considered to be perched and not reflective of the underlying Aquifers and no remediation was required. In line with the above, the risk to the Secondary Undifferentiated Aquifer is considered to be low.
	Migration through saturated zone	Principal Aquifer (Groundwater)	Unlikely	Medium	Low	There are no potable water groundwater abstraction licences or Source Protection Zones near the site. Glacial Till is recorded beneath the made ground across the entirety of the site which will break the pathway from the potentially contaminated site soils to the Secondary Undifferentiated Aquifer. Evidence of significant mobile contamination was not recorded during the site investigation by Atkins in 2014. Localised lead contamination and low level PAH contamination was recorded in a number of the soil samples. Contamination recorded within the groundwater samples during the Atkins investigation was considered to be perched and not reflective of the underlying Aquifers and no remediation was required. In line with the above, the risk to the Principal Aquifer is considered to be low.

Summary

Based on the testing undertaken it would appear that there is widespread contamination within the made ground in the form of asbestos and benzo(a)pyrene attributed to ash/clinker within the strata. A localised exceedance of lead was also noted within made ground in WS05 likely associated with ash and clinker encountered within the made ground at this location.

Chrysotile asbestos fibres have been detected in five samples at trace levels (<0.001%). During the Atkins investigation asbestos was identified in soils across the site at concentrations of <0.001% to 0.573% with asbestos cement identified in one location (BH102). Construction workers should be made aware of the presence of asbestos in the site soils with the risk suitably managed by an Asbestos Management Plan.

Deep made ground was recorded across the site during the site works, however, evidence of degradable / putrescible material was localised to WS07 understood to be in proximity to a historic infilled pond. This location is located a significant distance from the proposed ground floor extension. A round of gas monitoring to confirm the risk did not reveal elevated methane or carbon dioxide levels. However, gas protection measures in line with CS2 were installed during the construction of the school prior to 2015 therefore, in order to stay consistent gas protection measures in line with CS2 will be required within the building extensions.

Whilst minor heavy metal and PAH contamination have been identified within the groundwater beneath the site, based on the assessments and updated CSM, BSL believe the overall risk to controlled waters is low and no further action is required.

Recommendations

Due to the nature of the development, comprising of a ground floor vertical extension (i.e. at ground level in the undercroft of the previous building), a Ground Gas Protection Measures Verification Plan and Asbestos Management Plan are considered to be sufficient to mitigate the risk.

Further Work

The following further work is considered necessary to progress the site to the construction phase:

- Design of Verification Plan for Ground Gas Protection Systems to be approved by the Local Authority.
- Implementation of Verification Plan and Asbestos Management Plan for the construction works.

We trust the above meets your requirements. If you have any queries, then please do not hesitate to contact the undersigned.

Yours sincerely

For Brownfield Solutions Ltd

Produced by:



Checked and approved by:



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Senior Project Engineer

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D M Gates

MGeoscience FGS

Principal Project Engineer

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Enc Drawings

Appendix A - BSL Phase II Geo-Environmental Assessment Report (2019)

DRAWINGS



Location Plan

1 : 1000 @ A1

P02	Red line boundary	12.07.23	SD	PH
P01	Issue for Planning	10/05/23	JP	PH
Revision	Description	Date	Drawn	Checked

Halliday Meecham Architects Limited

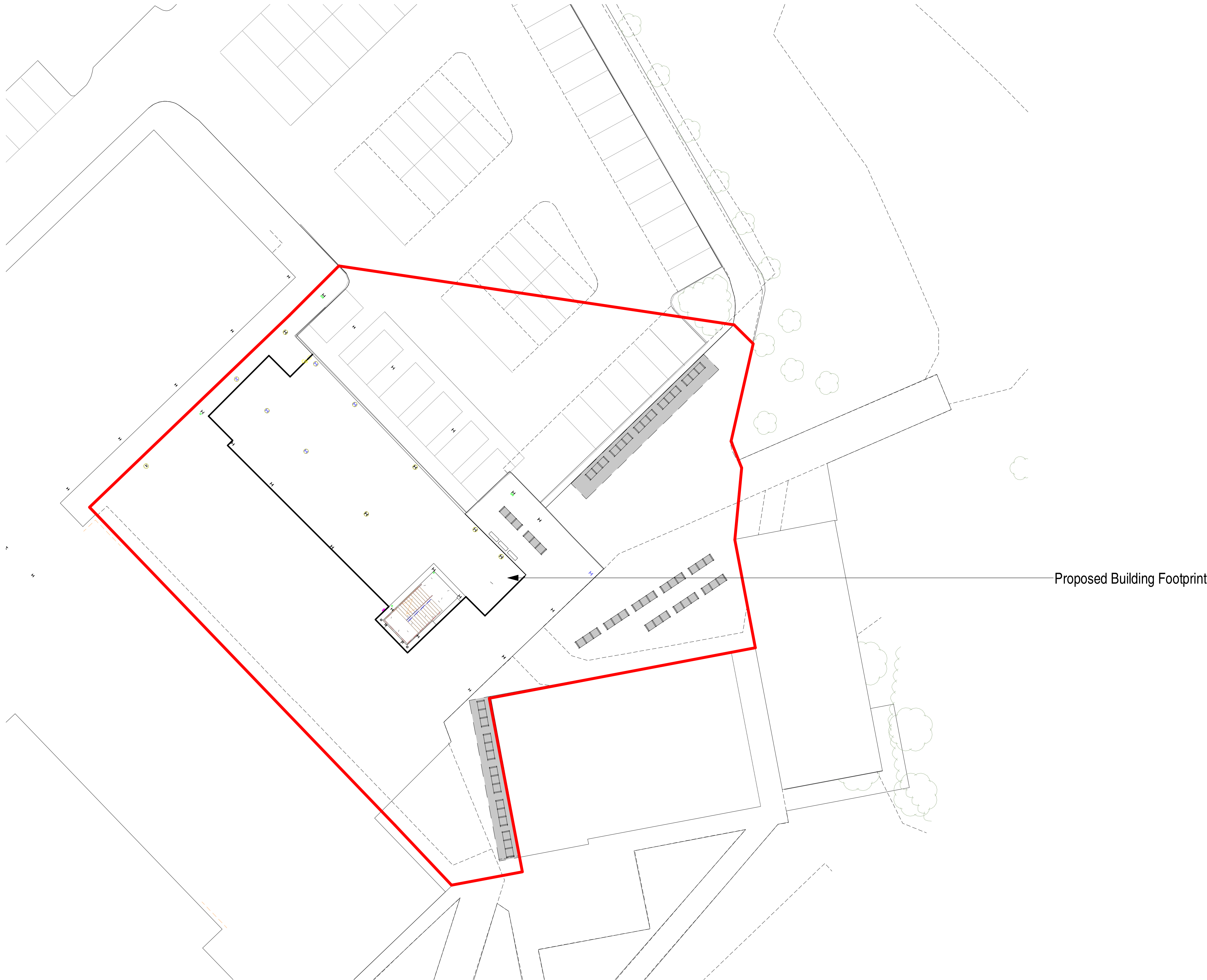
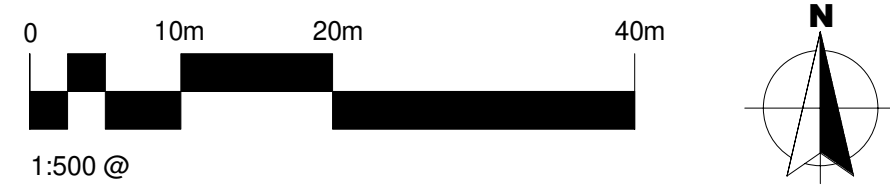
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4 Devonshire Street London W1W 5DT
+44 (0)203 440 5175

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Client:	Ardwick Academy						
Project:	Ardwick DT Fitness Suite						
Phase/ Location:	345 Stockport Rd, Manchester M13 0LF						
Drawing:	Location Plan						
Scale @ A1	Scale @ A3	Date:	Drawn:	Checked:	Job No.	Drawing No.	
1:1000	1:500	05/10/23	JP	PEH	5627	00001	
Drawing Ref.	5627-HMA-DTA-00-DR-A-00001						Revision
							P02



1 Proposed Block Plan
1:200 @ A1

T1	Fence removed	28.07.23	SD	PH
Tender				
P03	Condenser unit fence added	21.07.23	SD	PH
P02	Red line boundary	12.07.23	SD	PH
P01	Issue for Planning	10/05/23	JP	PH
Revision	Description	Date	Drawn	Checked

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Client:	Ardwick Academy					
Project:	Ardwick DT Fitness Suite					
Phase/Location:	345 Stockport Rd, Manchester M13 0LF					
Drawing:	Block Plan - Proposed					
Scale @ A1	Scale @ A3	Date:	Drawn:	Checked:	Job No.	Drawing No.
1:200		05/10/23	JP	PH	5627	00003
Drawing Ref.	5627-HMA-DTA-00-DR-A-00003					Revision T1

Proposed Landscape Legend

Proposed GIFA: 300.73 SQ.m

Proposed Wall

Existing Wall

Existing Car Park to remain

Existing Pathways to remain

Existing soft landscaping to remain

Existing Tarmac to be made good after construction

Existing fence - no alterations

Proposed fence - to match existing

Demo fence

Landscape Materials Key

1 : 50 @ A1

Bike Parking Total = 156

52% covered = 80 bikes



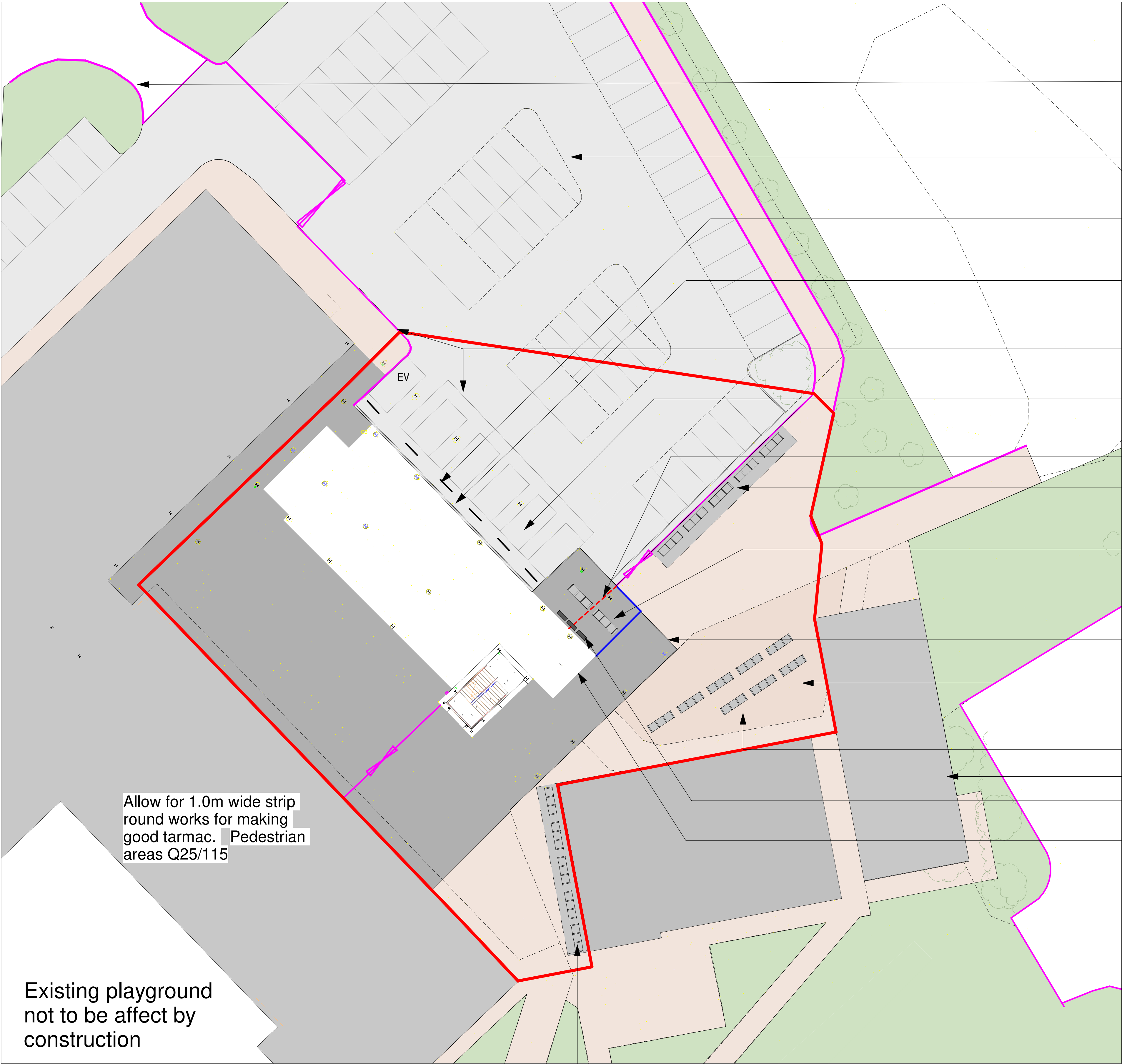
Image 1: Lean-to shelter supported off the building, as with existing canopies



Image 2: Covered cycle parking structure adjacent to the car parking

Proposed Landscape and Fencing Plan

1 : 200 @ A1

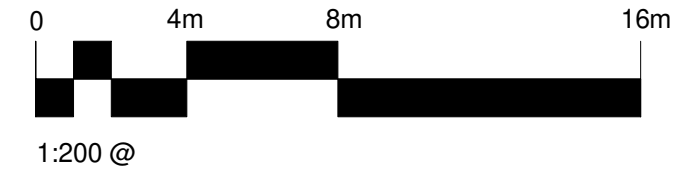


Allow for making good tarmac to all areas where there are fixings for street furniture, shelters and the like. Pedestrian areas Q25/115

Proposed 5 covered relocated cycle parking bays which total 40 bikes.Image 1 shelter (Lean-to)NBS B91/331

T1	Fence removed	28.07.23	SD	PH
Tender				
P06	Condenser unit fence added	21.07.23	SD	PH
P05	Red Line boundary	11.07.23	SD	PH
P04	Landscape updated to match TOPO & canopy images added	10.07.23	SD	PH
P03	Cycle parking altered to have covered parking along fence line	28/06/23	JP	PH
P02	Cycle Parking Layout Updated	23/06/23	JP	PH
P01	Issue for Planning	10/05/23	JP	PH

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- No change to vehicle acces / entrance
- No change to number of car parking spaces
- Proposed Sheffield hoops at the end of the parking bays to avoid colision with proposed building. Q50/210
- Area around the existing parking bays to be made good after construction
- Accessible parking spots (x5) and EV space (x1) to move back in line with existing kerb
- Allow for burning off existing road marking and applying new Q25/115
- Fencing line to be removed
- Proposed 5 covered cycle parking bays relocated which total 40 bikes. Image 2 shelter. NBS B91/332
- Proposed 2 covered cycle parking bays relocated which total 16 bikes.
- Tarmac to be made good after construction
- Proposed hard landscaping due to footfall traffic damaging the orignal grass
- Proposed relocated 8 cycle parking bays which total 64 bikes
- New portable building
- Condenser unit location. Mesh cage as per engineer
- Proposed line of building

Revision	Description	Date	Drawn	Checked
Halliday Meecham Architects Limited				
111 Piccadilly Manchester M1 2HY +44 (0)161 661 5566				
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HALLIDAY
MEECHAM
ARCHITECTS

Client: Ardwick Academy

Project: Ardwick DT Fitness Suite

Phase/ Location: 345 Stockport Rd, Manchester M13 0LF

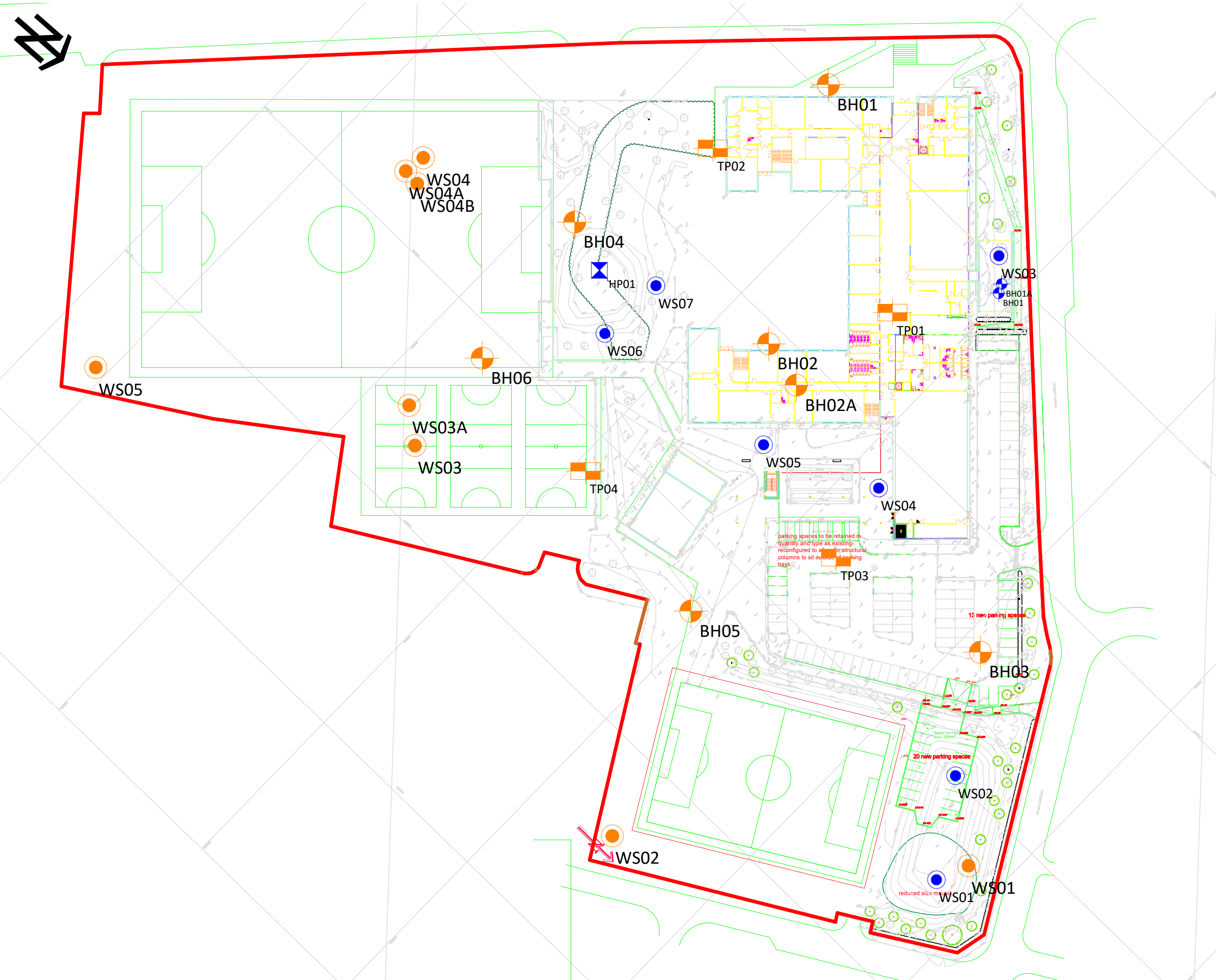
Drawing: Proposed Landscape & Fencing Plan

Scale @ A1	Scale @ A3	Date:	Drawn:	Checked:	Job No.	Drawing No.
1:200		05/10/23	JP	PH	5627	20105

Drawing Ref.

5627-HMA-DTA-00-DR-A-20105

Revision
T1



KEY	
—	APPROXIMATE SITE BOUNDARY
✕ HPXX	HAND EXCAVATED TRIAL PIT
● WSXX	WINDOW SAMPLE BOREHOLE
⊕ BHXX	CABLE PERCUSSIVE BOREHOLE
ATKINS (2014)	
■ TPXX	TRIAL PIT
● WSXX	WINDOW SAMPLE BOREHOLE
⊕ BHXX	CABLE PERCUSSIVE BOREHOLE

- NOTES
1. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT & ENGINEER FOR VERIFICATION. FIGURED DIMENSIONS ONLY ARE TO BE TAKEN FROM THIS DRAWING.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS REPORTS. THIS DRAWING IS COPYRIGHT OF BSL.
 3. DRAWING NOT FOR CONSTRUCTION PURPOSES.

REV	DATE	DESCRIPTION	BY	CKD
A	04/09/2019	Addition of BH01 and BH01A	NS	DMG



CLIENT			
THE DEAN TRUST			
PROJECT TITLE			
DEAN TRUST ACADEMY, ARDWICK, MANCHESTER			
DRAWING TITLE			
EXPLORATORY HOLE LOCATION PLAN			
DRAWING No.	REVISION	SCALE	DATE
M4246/02	B	NTS	08/09/23
DRAWN BY		CHECKED BY	
NS		DMG	

APPENDIX A

BSL Phase II Geo-Environmental Assessment Report (2019)

<https://brownfieldsolutions.sharepoint.com/:b:/s/Brownfield/Eco8upsRHAZFIZcBWpLLS5YBreai4GfHyAOC57e9omltnw?e=SfOfI0>