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Property Alliance Group Ltd

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GEOENVIRONMENTAL SITE REVIEW UPPER BROOK STREET, MANCHESTER

E3P has been appointed by Property Alliance Group (PAG) 'the client' to undertake a preliminary review with respect to Geoenvironmental and Geotechnical conditions, potential abnormal development constraints and engineering solutions that require consideration as part of the future redevelopment of the site.

E3P has been provided with the following reports that have been reviewed to inform our preliminary site appraisal:

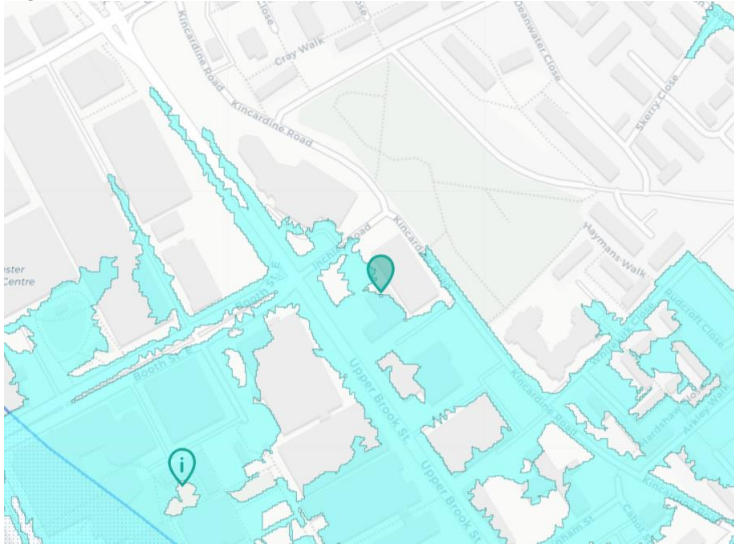
-  RoC Consulting: Phase 1 Desktop Study, Former Williams Car Dealership, Upper Brook Street, Manchester (ref: RoC Ltd / LD/ASp1/4208) dated 17th May 2021; and,
-  RoC Consulting: Phase 2 Site Investigation, Former Williams Car Dealership, Upper Brook Street, Manchester (ref: 4208-ROC-ZZ-XX-RP-ES-PH2SI) dated 25th January 2022.

To facilitate a suitably detailed site assessment, E3P has also undertaken a preliminary review of pertinent British Geological Survey, Environment Agency and Ordnance Survey maps and corresponding memoirs to ascertain potential issues that must be considered as part of the proposed site acquisition and future redevelopment.



Site Address	Former Williams Car Dealership, Upper Brook Street, Manchester, M13 9AJ	
Grid Reference	E384737, N396996	
Site Area	1.62 Ha.	
Current Site Use	The site is an irregular shaped parcel of land located east of Upper Brook Street in Manchester City Centre. It is bound by Kincardine Road to the north and Grosvenor Street to the northern extent. The site is bisected by Inchley Road running east-west. The site can be subdivided into two definitive parcels: the land to the north and south of Inchley Road. The former Williams Car Dealership occupies the northern sector; this is an irregular-shaped building (dating from the 1970s). The plot is vacant with all buildings having been boarded up and sealed. It is believed that the servicing and repair work for motor vehicles was completed in the rear of this building (fronting Kincardine Rd with the sales and commercial office space in the west adjacent to Upper Brook Street. The northern portion of this sector is asphalt open storage land. Bodywork repairs are reported to have been undertaken within this building, including spray painting and coatings, which required chemical storage. The RoC Report suggests that there is no reported evidence of recent or historical Underground Storage Tanks (USTs), however, when considering the age of the motor vehicle sales and repair garage dating to the 1970s, it is difficult to entirely discount the presence of such features. If USTs are present they are likely to be located at the east elevation of the building to the extremity of the repair workshops. The southern sector (south of Inchley Rd) was also occupied by a car dealership with buildings dating from the early to mid-1990s. A sales showroom and forecourt fronting Upper Brook Street are located immediately south of Inchley Road. A second motor vehicle sales showroom is located in the southwest sector (again fronting Upper Brook Street). The second area of motor vehicle repair workshops is located in the southwest sector with evidence of used motor oil storage in the external service yards. All buildings in the southern sector are 'boarded and sealed' but still remain.	
Environmental Setting	Drift Geology	Till (Devensian – CLAY) across the site.
	Bedrock Geology	Chester Sandstone Formation
	Faults	No faults within the development site.
	BGS Boreholes Records	Records indicate the presence of variable anthropogenic materials (~2.0-4.0m) overlying stiff glacial clays to ~6.0-7.0m. Sandstone bedrock is recorded @ ~31.5m AOD.
	Hydrogeology	Unproductive strata (drift) overlying Principal Aquifer (solid). No sensitive groundwater abstractions have been identified within a 1 km radius.
	Hydrology	The nearest surface water feature is indicated 130m to the north in the form of the River Medlock. The water quality of this receptor indicates a GQA Grade of "E" (Poor; 2000).



Flood Risk	The site is located within an area Classified as Flood Zone 2 (1000-year return event). The extent of Zone 2 Flood Risk is indicated in Figure 1 below. Figure 1 – Extent of Zone 2 Flood Risk 
Site History	Historical mapping from the mid 19th Century indicates that the site was occupied by residential housing across the central and southern sectors with a Sunday School, Library and housing to the north. Numerous historical roads transected the site serving the historical housing, schools and small works. A print works and clothing factory are located immediately north of Inchley Rd from ~1931. The site appears to have suffered bomb damage in the mid-1940s (WW2). The southern sector was occupied by engineering works from the 1950s onwards. The entire site area was cleared in the 1960s which coincided with the infrastructure development (including the Mancunian Way to the north). The existing car dealership located in the northern sector was constructed in the mid-1970s, this area remains largely in the same configuration to the present day. The southern sector was subsequently developed as car dealerships and ancillary motor vehicle service and repair workshops in the early to mid-1990s. At this time, all buildings remain fully intact with boarding to windows to prevent unauthorized access. No pertinent adjacent historical land uses are identified that would be considered a significant environmental or geotechnical risk.
Landfill Sites and Ground Gases	No recorded landfill within 500m of the site. The only viable source of hazardous ground gases would be attributed to the variable Made Ground beneath the subject site.
Radon	Unaffected – no special precautions are required.



Coal Mining/Land Stability	The site is not located within an area that would be considered to be at risk of subsidence associated with historical coal mining activities. No further assessment is required in respect to the risk from mining.
Geological Hazards	No ground stability hazards are identified.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.
Unexploded Ordnance	The site was affected by the bombing in WW2 including incendiary munitions striking the adjacent church. The site is considered to represent a high risk in terms of UXO, however, when considering the wholesale redevelopment since the mid 20th century this risk is reduced. It is recommended that a detailed UXO Report is commissioned. It is probable that some form of UXO clearance works will be required as part of the anticipated future regeneration.

PREVIOUS SITE INVESTIGATION REPORTS

RoC Consulting Phase 1 Desk Study May 2021	The site is occupied by a disused car dealership with associated showrooms, repair and maintenance workshops and commercial offices. It is stated by RoC that the buildings are not believed to have contained refuelling facilities. Localised chemical storage is noted within the site walkover within the repair and maintenance workshops and external storage. Historically the site was occupied by residential housing, print works and a clothing factory (in the north) prior to wholesale clearances post-WW2. The site was subsequently developed as car dealerships in the 1970s, '80s and early '90s. Historical land uses activities are identified as potential sources of PCBs, fuel oil, organic solvents and residual PAH and inorganic metalloid within the historically placed level raising materials. The high risk from UXO is identified, it is recommended that a detailed threat assessment be completed.
RoC Consulting Phase 2 Site Investigation January 2022	Ground Investigation works comprised the drilling of 12nr Window Sample boreholes to depths ranging between 1.36m and 5.45m. RoC stated that the exploratory holes were positioned to target areas where prior land uses have impacted soil and groundwater quality. The RoC Ground investigation confirms Made Ground from GL to a maximum proven depth of 3.40m with an average depth of 1.85m. Made Ground predominantly comprises historical demolition and upfill material. The Made Ground is underlain by variable cohesive and granular superficial drift deposits with rockhead inferred at a depth ranging between 2.30m and 3.70m. The Tier 1 contaminated land assessment identified elevated concentrations of inorganic metalloids and Polycyclic Aromatic Hydrocarbons (PAH) within the Made Ground when considering a residential end-use scenario with private gardens.



RoC Consulting Phase 2 Site Investigation January 2022	Detectable PCB impact is identified within the location of the historical sub-station. Elevated levels of hydrocarbons associated with non-volatile fractions, largely insoluble fractions are reported within the areas of the print works and vehicle repair workshop. Specialist contaminant resistant potable water supply pipes are recommended. The site is classified as Characteristic Situation 1 with respect to the risk from hazardous ground gasses, therefore no specialist mitigation measures are recommended in the construction of new buildings. The RoC Phase 2 investigation did not include any assessment of risk to controlled waters or the wider environs. UXO pre-clearance works in accordance with CIRIA C681 are recommended for any future works. Significant further detailed Ground Investigations are recommended, as a minimum, the following is suggested: ▪ Rotary cored boreholes to provide geotechnical information pertaining to the Chester formation sandstone bedrock. ▪ Further investigation of the void encountered in WS106. ▪ Trial Pits to assess the extent of relict foundations. Assessment of risk to principal Aquifer associated with the migration of organic solvents from the site.
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E3P CONTAMINATED LAND ASSESSMENT & SYNOPSIS

E3P has reviewed the existing Phase 1 Desk Study and subsequent Phase 2 intrusive Site Investigation and preliminary risk assessment reports prepared by RoC. Having considered the reported information in conjunction with our own review of the former site use and potential pollution risk, E3P would make the following comments.

- The RoC Phase 2 investigation is very much a preliminary site survey, limited by scope and access restrictions. RoC has recommended further extensive intrusive investigations.
- A review of historical mapping and point source pollution risk by E3P appears to indicate that the RoC boreholes and monitoring are within the general vicinity of specific areas of concern, however further detailed targeted analysis is required.
- Given the age and nature of the operations on-site, especially the motor vehicle repair workshops it is likely that some hydrocarbon impact will have permeated through the hard standing, drainage networks and other conduits impacting the near-surface soils.
- The former printing works and clothes manufacturing is identified as a source of pigments and dyes which would be inorganic metalloids, PAH and inorganic salts. Further investigation is required in these locations.
- Chlorinated organic solvents will have been used extensively for degreasing and pain removal for a prolonged period, there is a significant possibility these will have entered the near-surface soils.



- RoC suggest that there are no Underground Storage Tanks (USTs), however, based on the extensive experience of similar sites E3P would suggest that this statement be treated with caution. There is a reasonable probability of fuel and waste oil storage in USTs to the periphery of the motor vehicle repair workshops. It is recommended that a Ground Penetrating Radar Survey (GPRS) be completed to identify any subterranean features.
- It is probable that post demolition Ground Investigation will identify relatively localised hydrocarbon (fuel and oil) impact within the Made Ground. This impact is likely to pose a theoretical risk to future occupants and the wider environment necessitating remediation be delineation, removal and treatment.
- The site-wide Made ground will represent a risk in terms of residual inorganic metalloid, PAH, TPH and asbestos fibre impact. This risk will be mitigated by hardstanding development and clean cover systems to remove the viable exposure pathway.
- The underlying Principal Aquifer is considered a high-risk receptor in this setting due to the shallow nature of the bedrock and the limited/discontinuous nature of low permeability drift deposits. The most significant risk would be associated with the migration of dense non-aqueous phase chlorinated solvents vertically toward this receptor.
- In the event that near-surface chlorinated solvent or soluble phase aromatic compounds are identified, it would be necessary to remove the source (impacted soil).
- It will be necessary to install groundwater monitoring wells to confirm the absence of any soluble phase chlorinated solvent / soluble aromatic compounds that would be capable of migrating toward the critical receptor.
- RoC classifies the site as CS1, suggesting no ground gas mitigation measures are required. E3P would suggest that in the absence of any significant sources of hazardous ground gasses that this is a reasonable conclusion.
- There is the potential for volatile phase compounds that would remain at a level (post-remediation) that could post a long term risk in terms of volatilization to indoor air, therefore it is not possible to discount the need for vapour membranes at this time.

In summary, it is considered that there is a moderate risk in terms of as yet unidentified soluble phase compounds being present that are capable of migrating towards the critical receptor. Further detailed Ground Investigation and risk assessment are required to fully understand this risk.

It is probable that near-surface shallow contaminant impact can be remediated in a cost-effective way during the site demolition and enabling works, therefore the risk is considered to be reduced when considering the proposed end-use and planned acquisition.

The primary risk associated with the acquisition of this site would be associated with the lateral migration of chlorinated organic solvents towards the underlying highly sensitive aquifer. Chemical use and storage on-site will have been limited to a certain degree, therefore the risk profile could be considered to be slightly reduced.

If organic/chlorinated solvent impact is identified, the likely remediation solution would be shallow source removal and risk assessment and monitoring to demonstrate attenuation and dispersal of the compounds to demonstrate no unacceptable risk. This risk should be fully understood through further ground investigation, water sampling and robust risk assessment.



E3P PRELIMINARY GEOTECHNICAL ASSESSMENT

Underground Obstructions & Abnormal Ground Conditions	Significant concrete and brick obstructions have been encountered within the MADE GROUND, indicative of relic foundations from the former building and potential infilled basements in the southern sector of the site. Voids are identified as indicative of relict basements and cellars within the historical works buildings and residential properties which are to be anticipated across the site. During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the MADE GROUND to enable the construction of proposed plots. Variable and locally deep made is present across the site, this material will need to be sorted, processed and reengineered.
Allowable Bearing Pressure	The underlying natural clay and sand and gravel drift deposits have been assessed as being very stiff, high strength with a net allowable bearing pressure (ABP) in 100 kN/m² increasing to 150–200 kN/m² Given the size, scale and loading for the proposed structures, the Chester formation sandstone bedrock is identified as the target founding stratum. Further detailed geotechnical investigation is required to provide comprehensive data with respect to the rock mechanics to inform structural design.
Building Floor Slabs	The site-wide Made ground will require engineering and ground improvement for any ground bearing floor slabs.
Heave Precautions	Given that the underlying clay is of low volume change potential, heave precautions will not be required to the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.
Soakaway Drainage	The MADE GROUND and underlying granular soils are cohesive in nature and impacted by low-level inorganic and hydrocarbon compounds which would preclude the use of infiltration drainage systems.
Sulphate Assessment	Concrete classification will be DS1 AC1s. A further detailed investigation is required to confirm this assumption.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favorable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods; however, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Waste Characterisation	Any material that is to be disposed of off-site should undergo assessment using Technical Guidance WM3: Waste Classification – <i>Guidance on the classification and assessment of waste</i>. Due to the nature of the Made Ground and the potential for hydrocarbon impact, there is the possibility that some materials could be classified as hazardous for disposal off-site. If large basement excavations are proposed, a detailed WM3 waste characterization assessment is warranted.
Coal Mining	The site is not at risk from subsidence from historical coal mining activities.



E3P RECOMMENDATIONS

Based on the findings of the Geoenvironmental site assessment, the following additional works are recommended to be completed in due course:

- ✚ Detailed Ground Penetrating Radar Survey to identify any potentially Underground Storage Tanks (USTs).
- ✚ Detailed Unexploded Ordnance threat assessment report and where necessary on-site mitigation during any groundworks (including Ground Investigation).
- ✚ Detailed flood risk hydrology modelling to assess the risk from Flood Zone 2 (1000 year return event).
- ✚ Detailed Ground Investigation and contaminated land risk assessment within the areas of motor vehicle repair workshops and ancillary areas.
- ✚ Investigation to assess the risk associated with soluble/mobile phase contaminants migrating towards the underlying aquifer, deemed to be a high-risk receptor.
- ✚ Development of a remediation strategy to remove locally impacted soils as determined by the contaminated land risk assessment.
- ✚ Detailed geotechnical investigation including comprehensive rotary coring and rock mechanics analysis within the underlying Chester sandstone formations to inform structural engineering design.
- ✚ Robust WM3 waste characteristic analysis of materials that will be removed from site.
- ✚ Preparation of a comprehensive Site Investigation Report.
- ✚ Geotechnical earthworks strategy (infrastructure); and
- ✚ Remediation and enabling works strategy.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

Martin Dyer
Director
For and on behalf of E3P Ltd





Notes:				
P1	REVA	29.03.2022	EB	MD
Phase	Issue	Date	Drawn	Checked

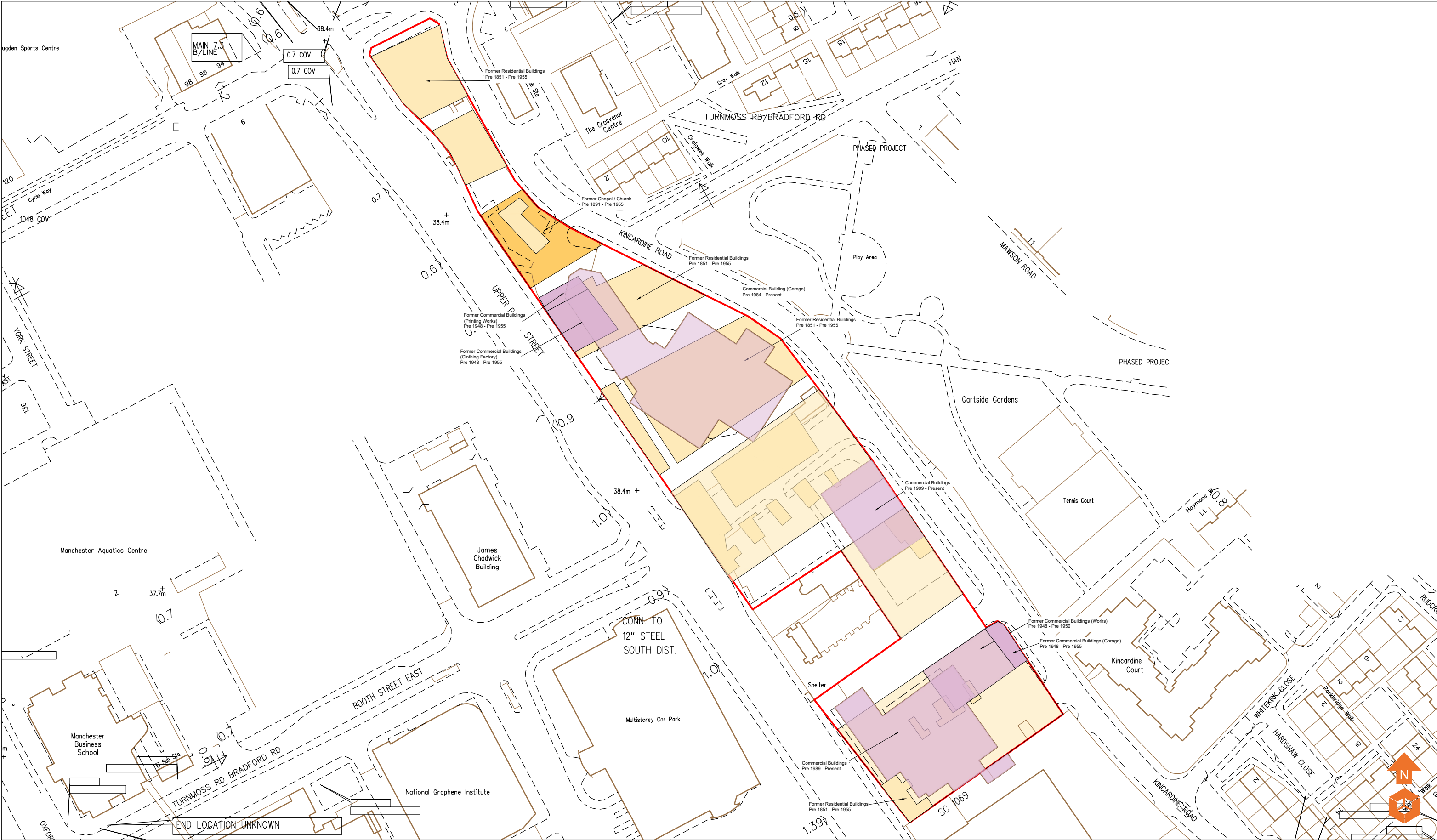
Client:	Property Alliance Group	
	Upper Brook Street	

Job No:	15-880	Date:	29.03.2022
Drawing No:	001	Scale:	NTS@ A3
Drawing Title:		Site Location Plan - Aerial	

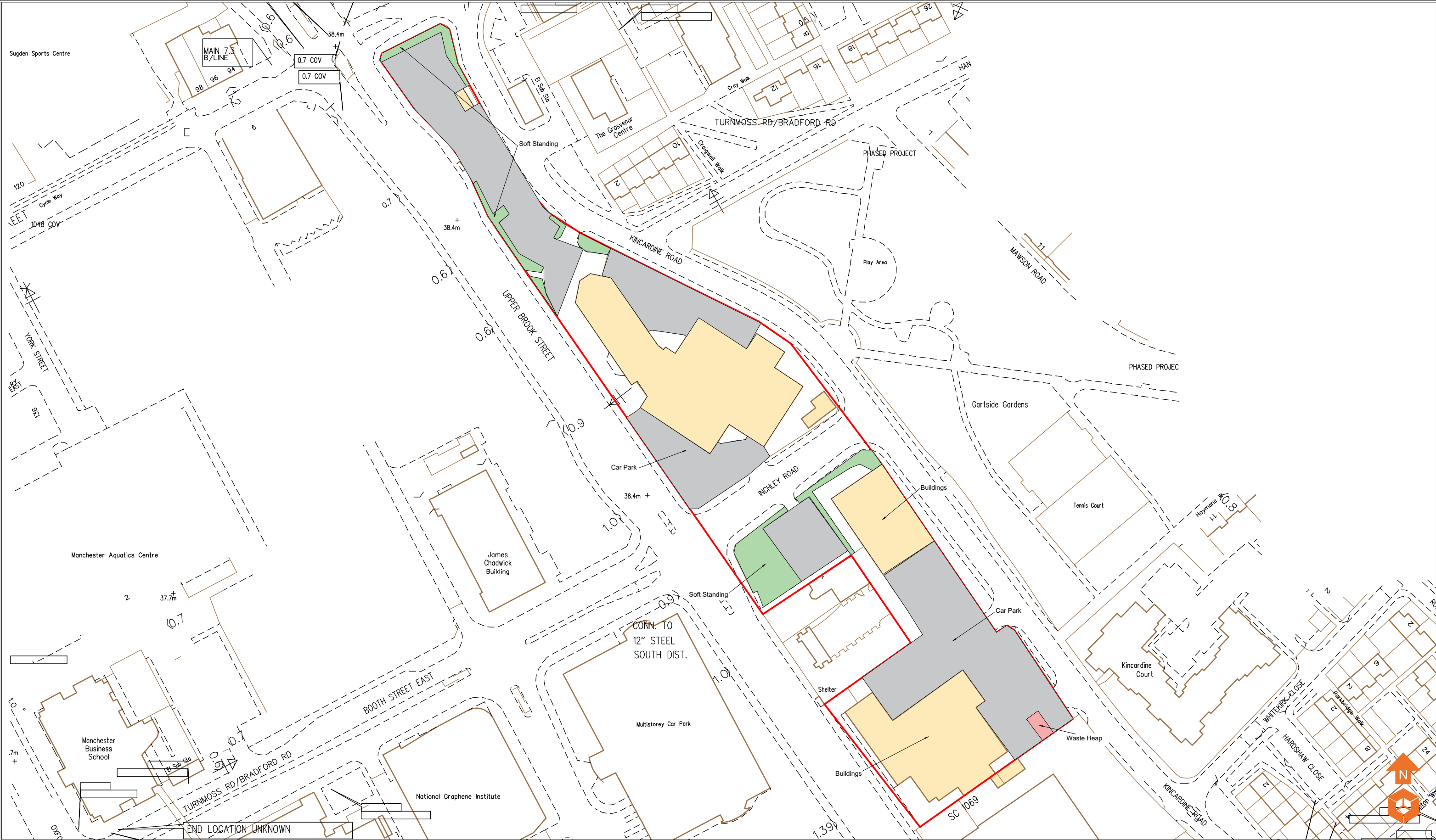


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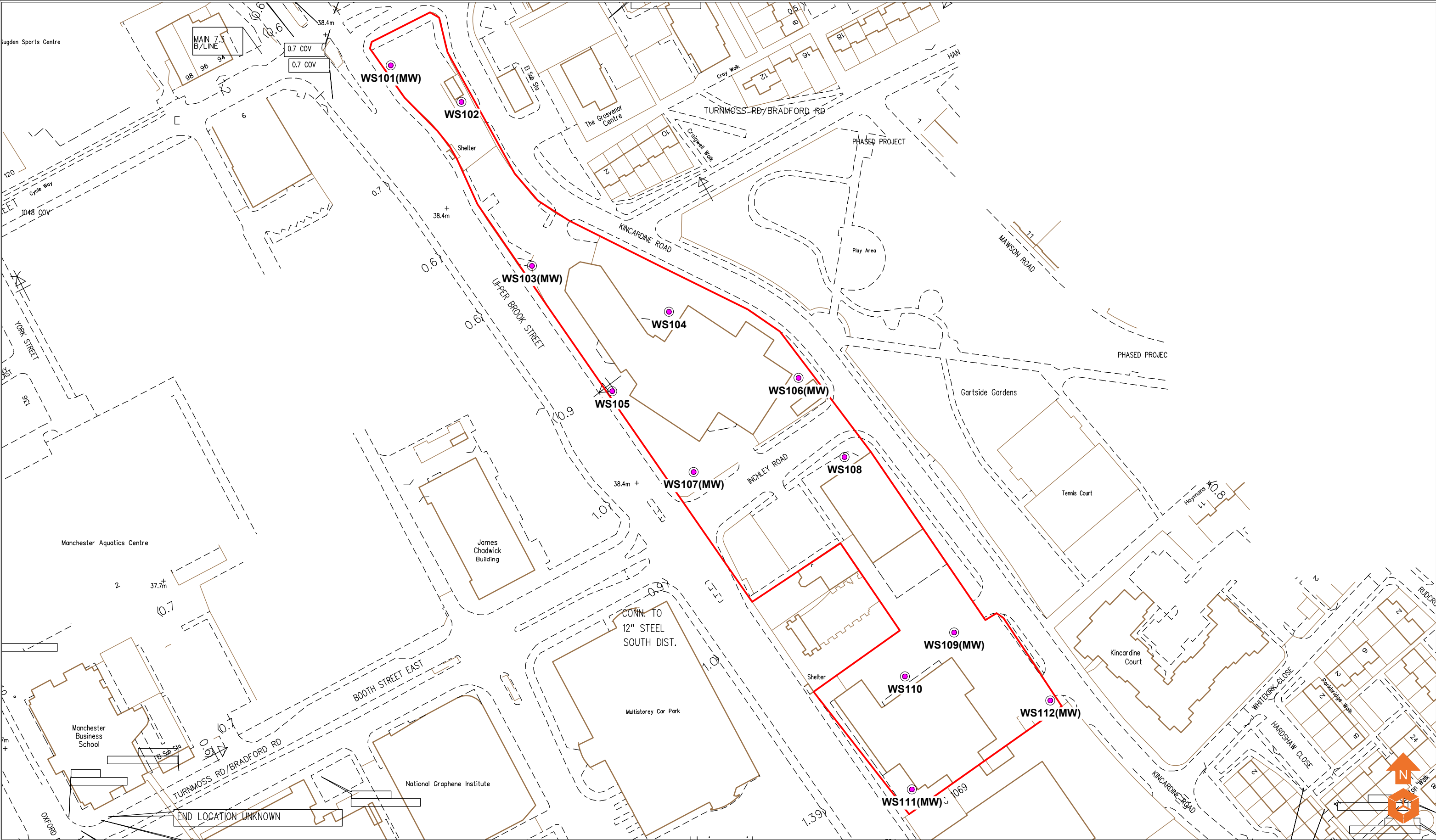
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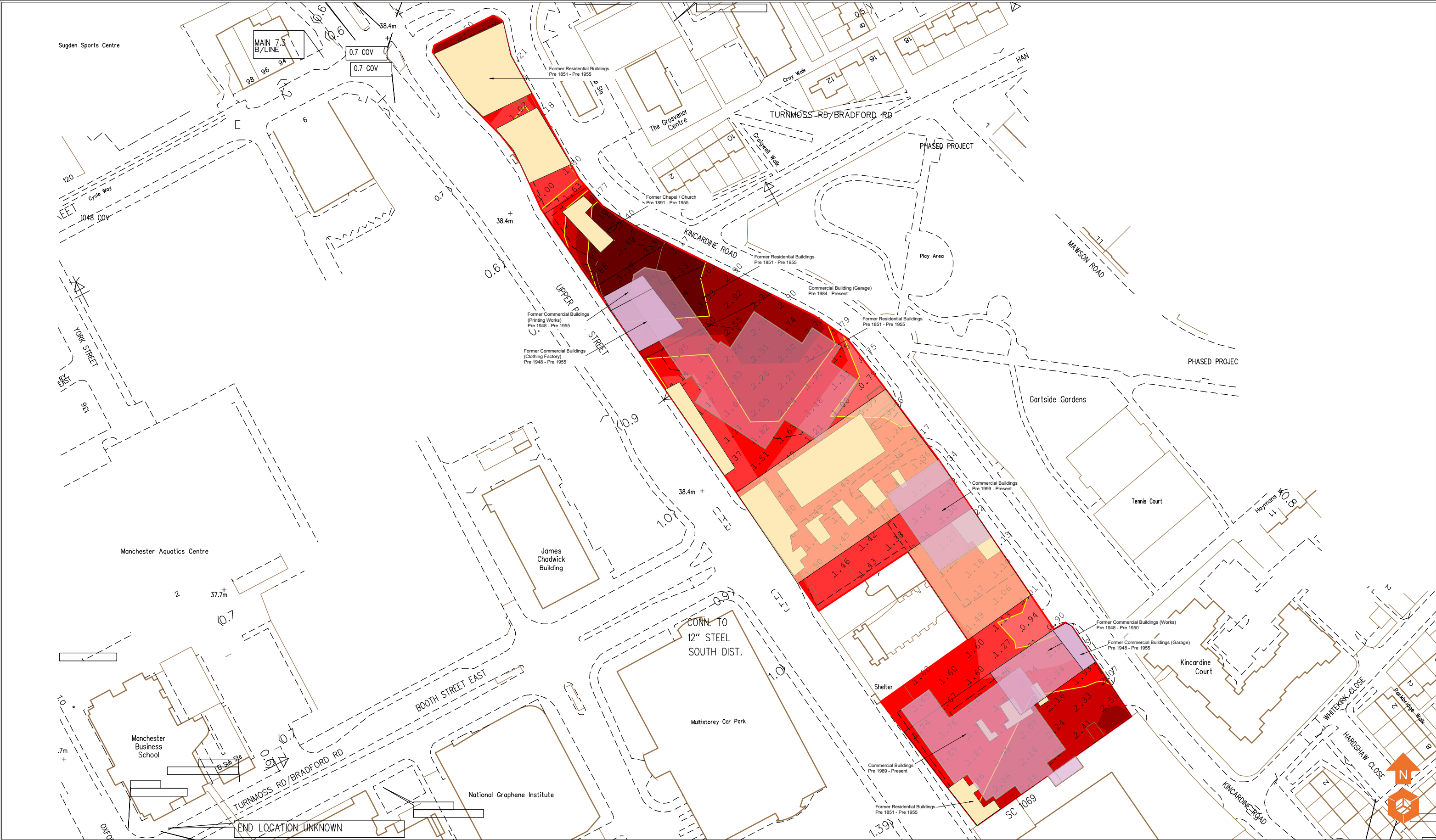
Historical Features Former Residential Buildings Former Commercial Buildings Former Chapel / Church	Notes:					Client: Property Alliance Group	Job No: 15-880	Date: 29.03.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk
							Drawing No: 003	Scale: NTS@ A3	
	P1 REVA 29.03.2022 EB MD Phase Issue Date Drawn Checked					Job Title: Upper Brook Street			



Site Features Buildings Car Parks Soft Standing Waste Heaps	Notes:	Client: Property Alliance Group	Job No: 15-880	Date: 29.03.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk
P1 REVA 29.03.2022 EB MD Phase Issue Date Drawn Checked	Job Title: Upper Brook Street	Drawing No: 004	Scale: NTS@ A3	Drawing Title: Site Features Plan	The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Location Symbols WS151 Approximate Window Sample Probehole Location (ROC Consulting - May 2021) WS151(100) Approximate Window Sample Probehole Location with Install (ROC Consulting - May 2021)					Notes:					Client: Property Alliance Group		Job No: 15-880	Date: 29.03.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk				
					P1REVA29.03.2022EBMD PhaseIssueDateDrawnChecked					Job Title: Upper Brook Street		Drawing No: 005		Scale: NTS@ A3	Drawing Title: Exploratory Hole Location Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	



Location Symbols

Approximate Window Sample Probehole Location (ROC Consulting - May 2021)

Approximate Window Sample Probehole Location with Install (ROC Consulting - May 2021)

Made Ground Depth (m)

Depth of Made Ground 0.50 - 0.99m

Depth of Made Ground 1.00 - 1.49m

Depth of Made Ground 1.50 - 1.99m

Depth of Made Ground 2.00 - 2.49m

Depth of Made Ground 2.50 - 2.99m

Depth of Made Ground >3.00m

Historical Features

Former Residential Buildings

Former Commercial Buildings

Former Chapel / Church

Notes:

P1	REVA	29.03.2022	EB	MD
Phase	Issue	Date	Drawn	Checked

Client:

Property Alliance Group

Job Title:

Upper Brook Street

Job No:

15-880

Drawing No:

006

Job Title:

Depth of Made Ground Plan

Date:

29.03.2022

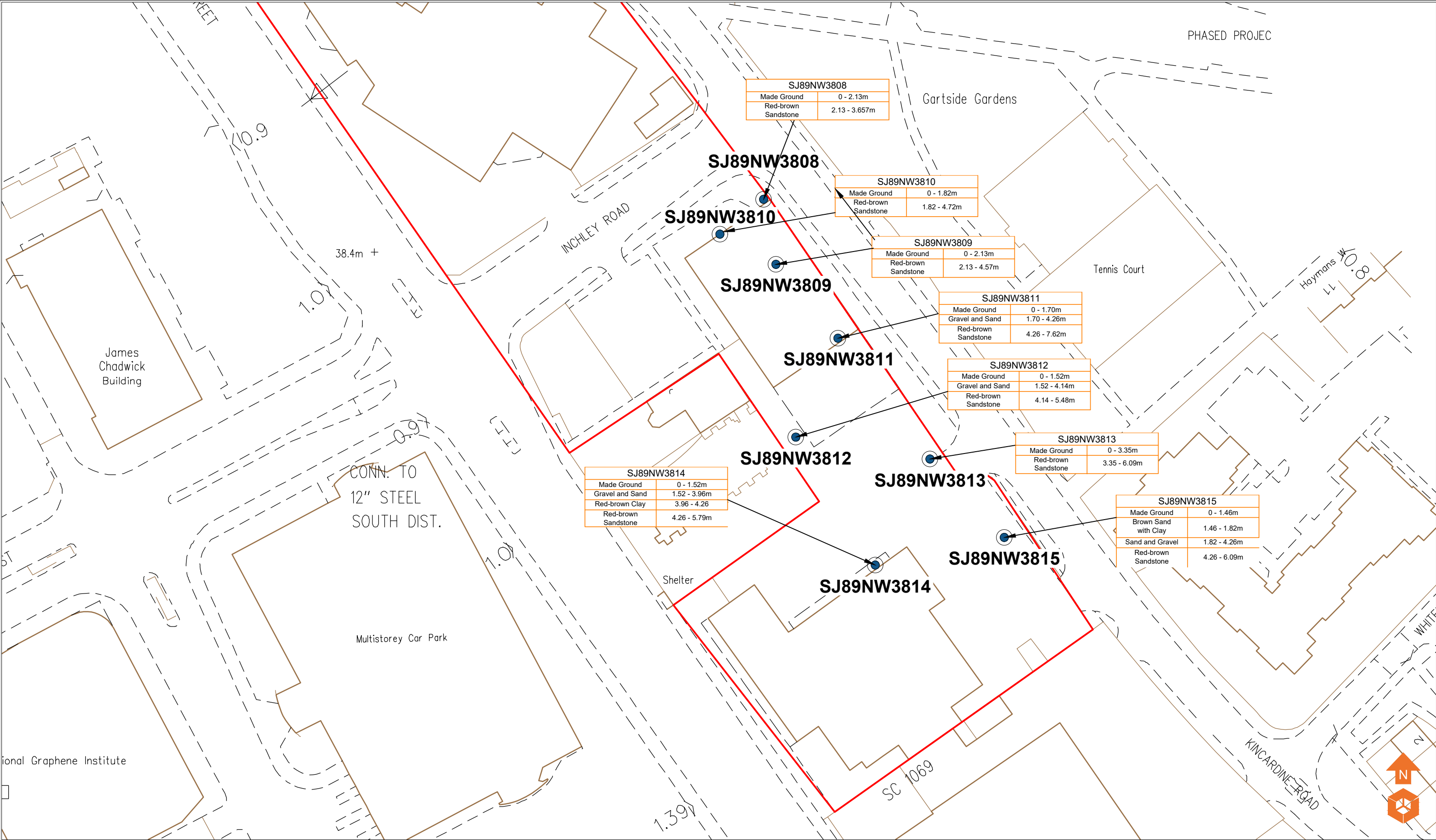
Scale:

NTS@ A3

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Location Symbols Approximate BGS Borehole Location	Notes:					Client: Property Alliance Group	Job No: 15-880	Date: 30.03.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk
							Drawing No: 023	Scale: NTS@ A3	
	P1 Phase	REVA Issue	30.03.2022 Date	LM Drawn	MD Checked	Job Title: Upper Brook Street	Drawing Title: BGS Borehole Location Plan	The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	