



Fusion Manchester Devco Ltd

DEANS_GATE SOUTH, MANCHESTER

Phase 1 Preliminary Risk Assessment Report





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Phase 1 Preliminary Risk Assessment Report

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1 INTRODUCTION

1.1 AUTHORISATION

WSP UK Ltd (WSP) was instructed by Rhomco Consulting Ltd (Rhomco) on behalf of Fusion Manchester Devco Ltd ('the client') to undertake a Phase 1 Preliminary Risk Assessment for the site referred to as the Deansgate, Manchester, M3 4LQ ('the site'). A site location plan is presented as Figure 1 in Appendix A. This report has been undertaken in accordance with our proposal, dated 13 January 2021.

1.2 OBJECTIVE

The primary objective of the preliminary risk assessment is to identify potential ground contamination risks in relation to a residential redevelopment of student accommodation, for submission with the planning application. Information on other ground-related development constraints that may be important to the client is also provided.

1.3 DEVELOPMENT PLANS

The client intends to redevelop the site with student accommodation and has provided various plans showing existing and proposed layouts. A topographical survey of the existing layout along with proposed lower ground floor and ground floor layouts are provided in Appendix A. The proposed layouts indicate there will be a significant lower ground floor area and no soft landscaping within the new development.

1.4 METHODOLOGY

This desk study and assessment have been undertaken with reference to the following guidance:

- Environment Agency's Land Contamination Risk Management (LCRM) Published 8 October 2020.
- Manchester City Council, Planning Guidance in Relation to Ground Contamination: Guidance Note for Applicants, Developers, Landowners and Consultants Version 6, dated September 2016;

1.5 SOURCES OF INFORMATION

The information presented within this report has been collated from the sources summarised in Table 1.

Table 1 – Sources of Information

Information Type	Details
Site Reconnaissance	1 Site walkover undertaken by WSP 18 January 2021 (Photographs and notes included as Appendix B)
Public Information	2 British Geological Survey (BGS) mapping and logs (BGS GeolIndex; accessed 15 January 2021) (copies of logs presented in Appendix D). 3 Manchester Bomb Map Record (The University of Manchester - https://luna.manchester.ac.uk/luna/servlet/view/search;JSESSIONID=e7dc7c75-920d-4b8a-89b2-dff74bc71acc?q=bomb%20damage&search=SUBMIT&QuickSearchA=QuickSearchA&sort=reference_number%2Ctitle&pgs=50&res=1&cic=maps002%7E1%7E1); 4 Zetica Unexploded Bomb Risk Map (included as Appendix E). 5 Groundsure Report (reference GS-7434699) (included as Appendix C)*; 6 The Coal Authority Interactive Map Viewer (accessed 15 January 2021). 7 Google searches and Google Earth Pro aerial images. 8 BGS / Environment Agency, The Permo-Triassic Sandstones of Manchester and East Cheshire – Groundwater Systems and Water Quality Commissioned Report CR/03/265N, 2003
* The report contains British Geological Survey materials ©NERC 2019 and Environment Agency information ©Environment Agency.	

1.6 CONFIDENTIALITY STATEMENT AND LIMITATIONS

The report is addressed to and may be relied upon by the following:

Fusion Manchester Devco Ltd of Fusion House, The Green, Letchmore Heath, Hertfordshire, WD25 8ER.

This assessment has been prepared for sole use of the above-named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP. No responsibility will be accepted where this report is used in its entirety or in part, by any other party. Information provided by others is taken in good faith as being accurate. WSP cannot and will not accept liability for any deficiencies in third party information. General Limitations are presented in Appendix H.

2 SITE DETAILS & ENVIRONMENTAL SETTING

2.1 SITE DESCRIPTION

Pertinent site details from a review of online mapping and a site walkover are summarised in Table 2-1. Notable site features are shown on Figure 2 in Appendix A. Photographs taken during the site walkover along with site walkover notes are presented in Appendix B.

Table 2-1 – Site Details

Item	Detail
Site Address	Deansgate, Manchester, M3 4LQ.
National Grid Coordinates	383294, 397430
Site Location	The site is located on the northern side of the junction between Bridgeway Viaduct and Deansgate in the southwest of Manchester City centre. Bridgeway Viaduct and Deansgate form the northern and southern site boundaries respectively.
Area, Elevation and Topography	The site is a 0.06ha approximately triangular plot of land located at approximately 30m above ordnance datum (AOD). The site is relatively flat except for a low concrete ramp in the western corner (Photo 12). Reference to the existing site topographical survey plan in Appendix A shows the western corner of the site is generally level with the road junction to the west (30.2m AOD), with levels rising to approximately 30.5m AOD in the east. Bridgeway Viaduct along the north-western site boundary increases slightly in elevation from southwest to northeast (Photos 1 and 3). In the northern corner, the site lies approximately 1m below the level of Bridgeway Viaduct. Deansgate, which runs along the southern boundary, falls by approximately 2.5m west to east. Off-site levels fall by a further 1.5m south-east to north-west along an access road that runs along the north-eastern site boundary to an underpass beneath Bridgewater Viaduct (Photos 4 and 10), which connects to the wharf area to the northwest (Photos 4 and 10). The ground level at the eastern corner the site lies approximately 1.5m above the level of the access road. At the northern corner of the site, the difference in elevations increases to approximately 4m (site walkover notes, Appendix B). The proposed lower ground floor layout plan provided in Appendix A indicates the central corridor will be at an elevation of 28.1m AOD; approximately 0.8m above the road to the northeast, meaning that much of the made up ground in the north and east of the site will need to be removed.
Site Description and Current Use	The information below is from the WSP site walkover on 18 January 2021. The site is covered with various concrete slabs; a contemporary slab with underlying membrane covers much of the north-western portion of the site, with remaining areas covered with older concrete slabs, in poor condition (Photos 5-7) with vegetation growing in gaps. An aerial image from Google Earth Pro (see Section 3) indicates the contemporary slab was related to use of the site as a construction compound, likely for an adjacent site. A broken manhole cover was noted beneath a board in the eastern area of the site (Photo 11). A low concrete ramp is located in the western corner (Photo 12). A brick wall of ca. 3m height is present along most of the north-eastern site boundary (Photo 5). In the northern corner of the site a blockwork corner of a former structure remains (Photo 9). The brick wall is likely to be on top of a significant retaining structure holding up the north-eastern edge of the site. In the northern corner of the site a small triangular area appears to bridge over the edge of the access road off site to the northeast (site walkover notes, Appendix B).

Item	Detail
Access and Site Boundaries	At the time of the site walkover the site was surrounded with timber hoarding along the north-western and southern boundaries. The eastern site boundary is formed by the brick wall, which appears to be related to former on-site buildings (Photo 3, Appendix B). Beyond the wall to the northeast the access road slopes down from Deansgate to the north-west passing underneath the Bridgewater Viaduct (Photos 3, 5, 6 and 9). The site is accessed through a gate in the hoarding at the western corner (Photos 1 and 8).
Surrounding Land Use	The site is surrounded in all directions by contemporary residential apartments that are in various stages of completion.

2.2 SITE ENVIRONMENTAL SETTING

GEOLOGY

Reference to the BGS GeoIndex (Ref. 2) indicates published geology comprises Glaciofluvial Sheet Deposits of sand and gravel, underlain by sandstone bedrock of the Chester Formation.

Based on the site history (See Section 3), Made Ground is anticipated to overlie natural strata.

To gain further insight into the likely ground conditions, a review has been completed of historical borehole logs accessible through the online BGS GeoIndex. Four borehole logs were identified within 60m of the site, their locations are shown on the extract from the BGS GeoIndex website below; details from the logs are presented in Table 2-2 (logs provided in Appendix D). The logs confirm sandstone rockhead is likely to be present at relatively shallow depth.

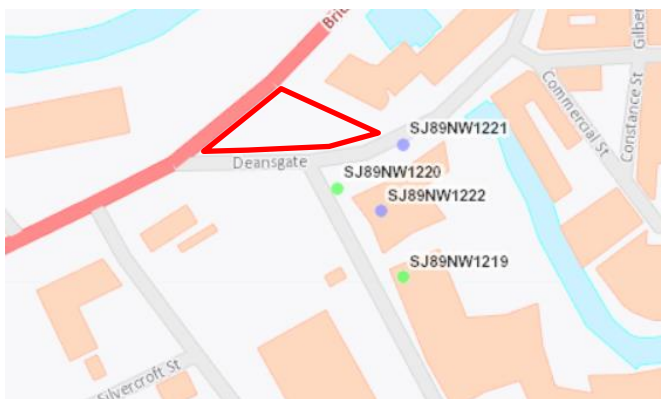


Table 2-2 – Strata encountered in BGS logs

BGS Log Reference	Approximate Distance from Site	Made Ground Depth (m bgl)	Depth to Base of Superficial Deposits / Top of Sandstone (m bgl)
SJ89W1221	20m east	2.7m	3.8m
SJ89W1220	30m south	2.5m	2.5m
SJ89W81222	40m south	0.9m	0.9m
SJ89W81219	60m south	1.9m	3.8m

HYDROGEOLOGY

The superficial deposits are classed as a Secondary A Aquifer; permeable layers that can support local water supplies and may form an important source of base flow to rivers.

The Chester Formation (sandstone bedrock) is classed as a Principal Aquifer; defined as having high intergranular and/or fracture permeability, meaning they usually provide a high level of water storage and transmission. They may support water supply and/or river base flow on a strategic scale.

The Groundsure report lists the underlying Manchester and East Cheshire Permo-Triassic Sandstone Aquifers as having 'Poor' chemical quality in 2015. Groundwater depths are not recorded on the nearest BGS borehole logs; however, Figure 3.8 of the BGS / Environment Agency report (Ref. 8) suggests the groundwater level in the Principal Aquifer is likely to be approximately 25m AOD (i.e. approximately 5m below site level).

Both aquifers are considered vulnerable to mobile contamination given the apparent prevalence of ground conditions that will likely permit contaminant migration.

The site is not located within a Source Protection Zone. The nearest Source Protection Zone is located 425m east of the site. There are eight groundwater abstractions recorded within 1km of the site (between 576m north and 967m northeast of the site).

HYDROLOGY

The nearest surface water feature is the River Medlock located 48m east of the site at its closest point. The river supplies the Castlefield Canal Basin, located 50m north of the site. The Groundsure report lists the River Medlock as having 'Moderate' chemical quality in 2016.

A tunnel (depth unconfirmed) that takes overflow water from the River Medlock passes the site approximately 20m to the northeast (see Section 3).

SENSITIVE LAND USES

There are no recorded sensitive land uses within 1km of the site. However, it is noted that the closest residential properties are located approximately 10-15m northeast and southeast of the site.

GROUND HAZARDS

Ground Stability

Ground stability hazards identified in the Groundsure Report are summarised in Table 2-3 below.

Table 2-3 – Ground Stability Hazard Summary

Stability Hazard	Risk Level
Potential for collapsible ground	Very Low
Potential for compressible ground	Negligible
Potential for dissolution	Negligible

Stability Hazard	Risk Level
Potential for landslides	Very Low
Potential for running sands	Very Low
Potential for swelling or shrinking clays	Negligible

Landfills and Waste Management

There are no historical landfills recorded within 250m of the site.

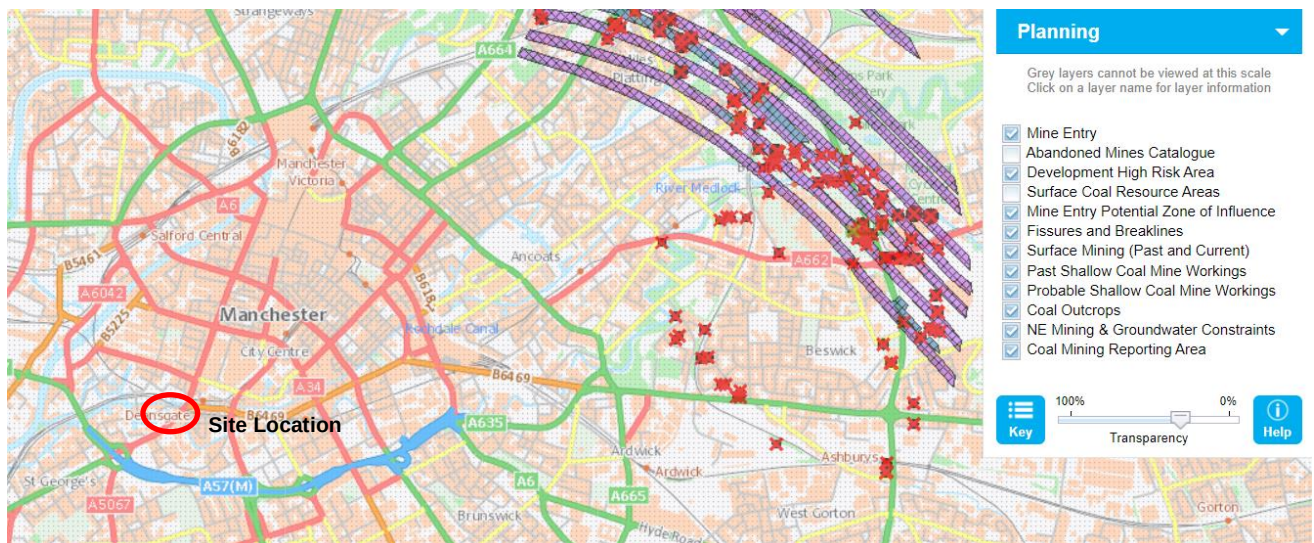
Radon

The site is within a lower probability radon area where less than 1% of properties are at or above action levels. Radon protection measures are not necessary in the construction of new properties within this area.

Coal Mining

A screenshot from the Coal Authority Online Viewer (Ref. 6) showing coal mining features is provided below; this indicates the site is not in an area likely to be affected by past coal mining.

Excerpt 2-1 – Coal Mining Risks



Unexploded Ordnance (UXO) Risk

A review of the Manchester Bomb Record image archive (Ref. 3) has been undertaken and is presented in Excerpt 2-2 below. The blue circles are understood to indicate incidences of 'high explosives', with the areas shaded in pink and red off-site indicate damaged and demolished buildings.

Excerpt 2.2- Manchester Bomb Record Map (Source – The University of Manchester) and Historical Map 1940-1941 (Groundsure Report)



The online Zetica Bomb Risk Map shows the site to be situated in an area of moderate risk for the potential presence of unexploded bombs. It is recommended that an unexploded ordnance (UXO) desktop threat assessment report is obtained to assess the UXO risk within the boundary. The UXO rating will have an impact on the scope of any required UXO mitigation to support future ground investigation works and foundation construction.

2.3 REGULATORY INFORMATION

A Groundsure Report (Ref. 2) has been obtained and reviewed for pertinent regulatory information which is summarised below:

- A total of 26 licensed discharge consents are recorded within 500m of the site, the closest of which are ca. 38m east of the site, relating to storm sewer overflow discharges, and 54m north, relating to discharge of final/ treated effluent and process effluent from Potato Wharf, Liverpool Road
- There are several historical waste sites recorded within 500m of the site, the closest of which is a refuse destructor site, recorded ca. 60m west of the site in 1948
- No active, recent or historical landfills are recorded within 500m of the site
- No sites designated as contaminated land under Part 2a of the Environmental Protection Act 1990 are recorded within 500m of the site.

2.4 CONTAMINATED LAND OFFICER (CLO) CONSULTATION

A request for information from the CLO at Manchester City Council was made on 15 January 2021. At the time of report issue, a response had not been received.

It is considered unlikely that any supplementary information that might be available directly from the CLO would have a significant impact on the broad conclusions drawn within this assessment; however, in the absence of these records it is not possible to be definitive in this statement and it is recommended that continued efforts are made to access these data from the CLO prior to commissioning intrusive ground investigation works.

Additional information may also be available regarding the status of below ground tanks relating to the former petrol filling station from the local Petroleum Officer (not contacted due to time constraints), which should also be pursued ahead of any intrusive works.

3 SITE HISTORY

The historical maps provided in the Groundsure report (Appendix C) have been reviewed; details of previous layouts and land uses are provided in a table in Appendix F with a summary provided below. Extracts of relevant information are provided on Figure 3 in Appendix A. It is noted by WSP that the site boundary indicated on the historical maps within the Groundsure report is mis-aligned on several maps, particularly the earliest detailed map (dated 1951).

The earliest map (1951) shows the site is part of 'The Old Warehouse' wharf development to the north, which is part of the Bridgewater canal basin industrial wharf complex. The site itself is occupied by several buildings in the west, a small building in the north and a 'pump' in the east with an access road from the north, indicating the north-eastern portion of the site is likely to be relatively level with the site to the north.

By 1893 the layout has changed, with an apparent boundary between the site and the off-site area to the northeast. There are two buildings adjacent to and parallel with the north-eastern boundary, with separate adjoining buildings off-site to the northeast. It appears therefore that the current site levels and the retaining structure along the north-eastern boundary would likely have been established prior to 1893.

The 1893 layout remained until the building in the southwest was removed (1948 map) and the buildings in the north were removed (1951 map). Maps dated 1960-1963 show a new garage development on site, with features in the western and eastern portions of the site. The map dated 1986-1990 shows an expanded feature over the eastern portion. A Google Earth image from 2000 indicates the feature in the west was likely a canopy/filling station forecourt and the feature in the east a building, likely the shop.

Traces of the layout outline shown on the 1960-1963 maps can be seen within the concrete slabs on current Google Maps aerial imagery (date unknown), suggesting this layout remained to very recently. A more recent image (2020) from Google Earth Pro shows the contemporary concrete slab that was observed during the walkover, likely associated with construction activities on nearby sites.

The site historically comprised part of the industrial wharf area to the north, with industrial, commercial and residential land uses in the vicinity. The map dated 1948-1949 shows some buildings in the vicinity have been removed, assumed to be related to bomb damage from WW2.

Potentially contaminative adjacent land uses include an engineering works to the north, a garage to the south and the Knott Mill iron works / engineering works, which was located on the south side of Deansgate approximately 20m from the site up until the 1980s, when it was cleared. The wider area is currently undergoing extensive re-development principally through the construction of high density residential apartment blocks.

Given the presence of an historical 'pump' on site, followed by raising of site levels; and the use of the site as a garage/petrol filling station, there is considered to be a high potential for some ground and ground water quality impacts (chemical) in the subsurface at the site. The potential also exists for ground contamination from historical potentially contaminative activities on nearby sites to have migrated beneath and resulted in impact to the site.



Given the site history, the potential for significant in-ground obstructions relating to foundations and potentially below ground structures (e.g. tanks) is considered to be high. The retaining structure on the north-eastern boundary is also likely to extend within the site boundary.

4 CONCEPTUAL SITE MODEL

4.1 INTRODUCTION

The potential risks from contamination within soil and groundwater are assessed based on the environmental setting of the site, anticipated ground conditions, potential sources of contamination and the proposed use of the site.

The source-pathway-receptor model forms the basis of the risk assessment; potential risks are only considered to exist where there is a credible source (e.g. chemical substance capable of causing harm); a pathway for migration of the source to the receptor; and a sensitive receptor that could be affected (e.g. nearby river or site users). A source-pathway-receptor contaminant linkage assessment is termed a conceptual site model (CSM). A preliminary CSM is produced prior to intrusive ground investigation and is refined following collection of site-specific data (if appropriate).

This CSM has been prepared based on the site being redeveloped according to the proposed layout plans provided; i.e. student accommodation with a lower ground floor and no soft landscaping.

4.2 GROUND MODEL

The ground conditions at the site are anticipated to comprise concrete slabs (multiple layers) at ground level over the majority of the site area, overlying Made Ground material. The depth of the Made Ground, although not confirmed, is considered likely to be significantly thicker in the east/north as a result of the historical levelling and supported by a retaining structure along the north-eastern boundary. The proposed lower ground floor layout plan provided in Appendix A suggests that construction of the lower ground floor will require existing ground levels to be reduced by approximately 3-4m, likely requiring the removal of the current retaining wall along the north-eastern boundary and a significant proportion of the Made Ground materials.

Underlying the Made Ground, natural soils are expected to comprise relatively permeable granular glaciofluvial deposits (sands and gravels), anticipated to be underlain by sandstone of the Chester Formation. Rockhead is expected to be encountered a few metres below ground level and the upper surface of the sandstone bedrock is potentially highly weathered.

As stated previously, in-ground obstructions in relation to previous structures and the existing retaining wall on the north-eastern boundary are expected.

Groundwater in the underlying sandstone aquifer (Principal Aquifer) is expected at relatively shallow depth (5m below ground level (bgl)). Shallower groundwater may also be present perched within the Made Ground or within the granular superficial soils (Secondary A Aquifer). Groundwater vulnerability mapping highlights that the granular nature of the overburden is unlikely to offer any significant protection to the underlying aquifers, making them relatively vulnerable to mobile contamination.

The River Medlock is located 48m northeast (topographically down-gradient) of the site and is therefore considered to be an important potentially viable receptor.

4.3 SOURCES, PATHWAYS AND RECEPTORS

The potential sources of contamination, receptors relevant to the environmental setting and the proposed residential redevelopment and potential exposure pathways have been identified and are presented below.

POTENTIAL CONTAMINATION SOURCES

The following potential sources of contamination have been identified:

- Contaminants of concern within Made Ground materials used to raise site levels in the north / east. This could potentially include asbestos.
- Contaminants of concern relating to the former use of the site as a garage– including fuels, oils, solvents and others.
- Contaminants of concern relating to former off-site industrial uses that may have migrated beneath the site.
- Hazardous ground gases arising from significant depths of putrescible/degradable Made Ground on-site and off-site.

POTENTIAL RECEPTORS

Relevant potential receptors are:

- Construction workers during redevelopment.
- Neighbouring site users.
- Future site users (i.e. students, site workers, maintenance workers).
- Underlying groundwater and the wider groundwater environment.
- Surface waters including the River Medlock 48m east and Castlefield Canal Basin 50m northwest
- Future below ground potable water pipes.

POTENTIAL EXPOSURE PATHWAYS

Relevant potential pathways are:

- Inhalation of asbestos fibres if liberated from soils,
- Direct contact, ingestion and inhalation of other soil-bound chemical substances,
- Inhalation of vapours associated with volatile substances in soil or groundwater.
- Migration of hazardous ground gases through shallow soils and accumulation in confined spaces, followed by inhalation / risk of explosion,
- Migration of leachable/ mobile contaminants through soil and groundwater.
- Direct contact between contaminants and buried services.

4.4 CONTAMINANT LINKAGE ASSESSMENT

On the basis of the information reviewed, the potential contaminant linkages that could be present are provided in Table 4-1 along with an assessment of potential risk.

In summary, the following contaminant linkages are considered to be potentially viable and should be considered in the scoping of subsequent intrusive ground investigation:

TEMPORARY LINKAGES DURING REDEVELOPMENT

- Human health risks to ground workers and third parties (neighbours) associated with inhalation of asbestos fibres that could be released during Made Ground disturbance and excavation.
- Human health risks to ground workers and third parties (neighbours) due to direct contact / ingestion / inhalation of possible soil and groundwater contaminants/ hazardous ground gases.
- Enhanced or increased mobilisation of any site based contamination sources during the investigation and construction process, allowing or facilitating migration of site-based sources away from the site both vertically and laterally, resulting in offsite receptor (groundwater and surface water) impact.

AFTER REDEVELOPMENT

- Potential risks to future site users and maintenance workers from inhalation of accumulated vapours associated with underlying contamination or hazardous ground gases in confined spaces, if present.
- Potential risks to future residents if new potable water pipes are laid in contaminated soils.

These potentially complete contaminant linkages could be broken by completing some relatively basic remediation/ mitigation works if sources are proven to be present, e.g. removal of hot spots of contamination, appropriate re-use of materials, provision of barrier pipe for potable water supplies in affected areas, provision of gas mitigation measures in properties. The requirement for these measures should be confirmed through appropriate ground investigation and risk assessment.

CURRENT CONDITION AND POST-DEVELOPMENT

- Migration of mobile contamination (e.g. fuels, oils, solvents) to wider groundwater body (including Principal Aquifer) and surface waters (e.g. River Medlock). This could be exacerbated by the development process, e.g. piling.

4.5 CONTAMINATION RISK RANKING

A qualitative risk ranking has been applied to the potentially complete contaminant linkages presented in Table 4-1 (based on CIRIA C552 documentation), which considers a combination of the potential severity of the harm and the likelihood of the harm occurring. The CIRIA risk ranking is described in Appendix G. The overall soil/ groundwater contamination risk ranking for the site is considered to be **moderate**.

Table 4-1 – Contaminant Linkage Assessment

Source	Pathway	Receptor	Probability of Complete Linkage	Consequence if Linkage Present	Risk Level	Comments
Asbestos within Made Ground	Liberation followed by inhalation	Construction workers during redevelopment	Likely	Medium	Moderate	Made Ground may contain asbestos fibres that could be liberated during ground works. Measures to prevent exposure during these works will likely be required.
		Neighbouring site users	Unlikely	Medium	Low	If asbestos is liberated during ground works, there is a potential for exposure, but this is considered low due to the distance from the site
		Site end users and maintenance workers	Not possible	Medium	Very Low Risk	The proposed development does not include any soft landscaping so there would be no exposure pathway in the completed development
Chemicals of concern within Made Ground or from spills / leaks from previous historical uses on site/ off-site	Direct contact, ingestion, dust inhalation	Construction Workers (during redevelopment)	Likely	Mild	Moderate / Low	Exposure of construction workers to contamination in soils and groundwater is possible during construction, particularly groundworks. Measures to limit exposure (e.g. appropriate PPE) may be required.
		Adjacent site users	Unlikely	Mild	Very Low	Adjacent site users unlikely to be exposed to chemical contamination during construction due to distance from site and limited exposure times. Following construction, no exposure pathway.
		Site end users and maintenance workers (post development)	Not possible	Mild	Very Low Risk	The proposed development does not include any soft landscaping so there would be no exposure pathway in the completed development
	Leaching / mobilisation and migration	Secondary A and Principal Aquifers / surface waters	Low Likelihood	Medium	Moderate/ Low	If chemicals of concern are present, they could be migrating through granular soils and rock to impact the aquifers. Remedial measures may be required to limit this in the future. A piling risk assessment may be required to confirm piling will not introduce new migration pathways. Measures may need to be taken to prevent mobilisation of chemicals of concern during construction.

Source	Pathway	Receptor	Probability of Complete Linkage	Consequence if Linkage Present	Risk Level	Comments
	Direct Contact	Water Supply pipes (post development)	Low Likelihood	Medium	Moderate/ Low	If below ground water supply pipes were placed in contaminated soils the pipes could be vulnerable. However, given the size of the site and proximity to main services likely along roads, the length of service is likely to be limited.
Vapours associated with chemical substances of concern in soil / groundwater from previous historical uses on site/ off-site	Inhalation	Construction Workers (during redevelopment)	Low Likelihood	Mild	Low	Volatile organic compounds (VOC) potentially present in soil and groundwater and able to accumulate in confined spaces; PPE and safety measures may be required to mitigate potential risks.
		Neighbouring site users	Unlikely	Medium	Low	If a significant source is present, VOC could migrate into confined spaces within adjacent developments. Remedial measures may be necessary to mitigate risks.
		Site end users and maintenance workers (post development)	Low Likelihood	Medium	Moderate/ Low	If present, VOC could migrate into confined spaces in the lower ground floor within the new development. Remedial measures may be necessary to mitigate risks.
Hazardous ground gases arising from Made Ground	Accumulation in confined spaces followed by inhalation, asphyxiation, explosion	Construction workers	Unlikely	Severe	Moderate/Low	Given the likely age of the fill materials (1890s) and the likelihood that much of this material will be removed from site, significant gas generation is considered unlikely but cannot be ruled out. Potential risks during construction would be managed by appropriate PPE and safety measures.
		Neighbouring site users	Unlikely	Severe	Moderate/Low	Significant proportion of Made Ground expected to be removed during construction of lower ground floor so residual risk considered to be negligible following redevelopment.
		Site end users and maintenance workers	Unlikely	Severe	Moderate/Low	

5 PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the proposed development and assumptions regarding the likely structural loads associated with such a development, pad or raft foundations are not considered suitable. A piled foundation solution is likely to be required with the use of rock socketed, continuous flight auger (CFA) or rotary bored piles considered to be the most suitable piling techniques.

Suspended ground floor construction should be assumed at this stage although, it is possible that with appropriate re-engineering of the ground, a ground bearing solution may be feasible.

The risk of obstructions associated with previous developments of the site is considered to be high. Obstructions may significantly hinder the installation of bearing piles and groundworks in general. A detailed strategy will be required for managing obstructions within the Made Ground to minimise potential delays on site and associated abnormal costs.

The stability of the Made Ground or natural granular soils should not be relied upon in unsupported excavations. Safe working conditions should be ensured at all times where persons are required to work in any excavations. This can be achieved by the use of ground support or battering back to a safe angle. Appropriate consideration will need to be given to the stability of adjacent boundaries, structures and infrastructure when designing temporary works.

The risk of encountering groundwater in shallow excavations for pile caps and ground beams is considered to be low. However, there is a risk of encountering bodies of perched water within the Made Ground, which may require local control (e.g. by sump pumping). Groundwater monitoring will be required as part of any future ground investigation.

Aggressive ground conditions (e.g. in excess of Design Sulphate Class DS3) may be present on the site. Laboratory chemical analysis of soil samples will be required to determine an appropriate concrete classification for proposed structures.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY

A review of the site history indicates that the site was developed with several unspecified buildings in the past and was last used as a petrol filling station. The site was located in an area of extensive industrial land use during the 19th and 20th century.

The land use history of the site, and ground investigation information from adjacent historical borehole records suggest that Made Ground of significant thickness is likely present on the site, particularly in the north and east. In-ground obstructions in the form of remnant foundations, floor slabs or underground structures may be present on the site. Natural strata beneath the site are anticipated to comprise granular glaciofluvial deposits (where present) overlying sandstone of the Chester Pebble Beds Formation (Principal Aquifer), which is expected at relatively shallow depth.

6.2 CONCLUSIONS

ENVIRONMENTAL

Given the site's land use history, a number of substances of concern could potentially be present within the underlying soils/ groundwater, which could present a risk to human health and controlled waters receptors via a number of potentially complete contaminant linkages. The potential development constraints associated with contamination are considered to include:

- The potential requirement for enhanced health and safety controls/ procedures during redevelopment to mitigate potential risks to human health and controlled waters from chemical substances in soil/ groundwater.
- The potential requirement for remedial measures to mitigate future risks to future site users and/ or controlled waters receptors. Potential remedial measures may include the removal or treatment of contamination hot spots (soil and groundwater), the placement of clean materials particularly in utility service corridors, the placement of clean cover soils in landscaped areas, and the implementation of ground gas protection measures into the proposed development.
- The presence of chemical or asbestos contamination within excess excavated soils or any chemical impact in recovered shallow groundwater, where identified would have implications with regards to material reuse and/or off-site disposal to landfill, treatment facility.

On the basis of the reviewed information and the preliminary risk assessment, the likelihood of the site being classified as statutory contaminated land (i.e. presenting a significant risk of significant harm) is considered to be moderate/ low.

Intrusive site investigation and risk assessment is required to provide further information on ground and groundwater conditions and any associated risks to the identified receptors.

GEOTECHNICAL

- The use of piled foundations and suspended ground floor construction should be assumed for the proposed development; the findings of this assessment and findings from any subsequent intrusive ground investigations of the site should be provided to an experienced piling contractor;

- The risk of obstructions associated with previous developments on the site is considered to be high and a detailed mitigation strategy will be required to minimise potential delays on site and associated abnormal costs;
- The stability of the Made Ground or natural granular soils should not be relied upon in unsupported excavations, and appropriately designed temporary works will be required to support excavations within the site and structures and infrastructure out with the site boundaries;
- Groundwater is considered unlikely to pose a significant risk to shallow excavations for pile caps and ground beams although, there is a risk of encountering perched groundwater bodies within the Made Ground, which may require appropriate dewatering.

6.3 RECOMMENDATIONS

Based on the findings of the PRA it is recommended that a Phase 2 intrusive ground investigation of the site is undertaken. The ground investigation should be designed to achieve the following objectives:

- Confirm the presence/ absence of contaminant linkages, confirm liabilities and identify abnormal development constraints associated with contamination and ground conditions (including soil gases).
- Obtain geotechnical parameters of soils and rock to aid in the design of substructures; the groundwater level will need to be confirmed as part of any future ground investigation.
- Obtain sufficient data on ground conditions and ground/ groundwater contamination to inform a ground investigation report and remediation strategy (if required), which are likely to be a planning condition.
- Provide data to enable a waste classification assessment of any soils destined to be taken off site during redevelopment to determine appropriate disposal routes and cost estimates.

It is recommended that the following information is obtained prior to undertaking an intrusive ground investigation:

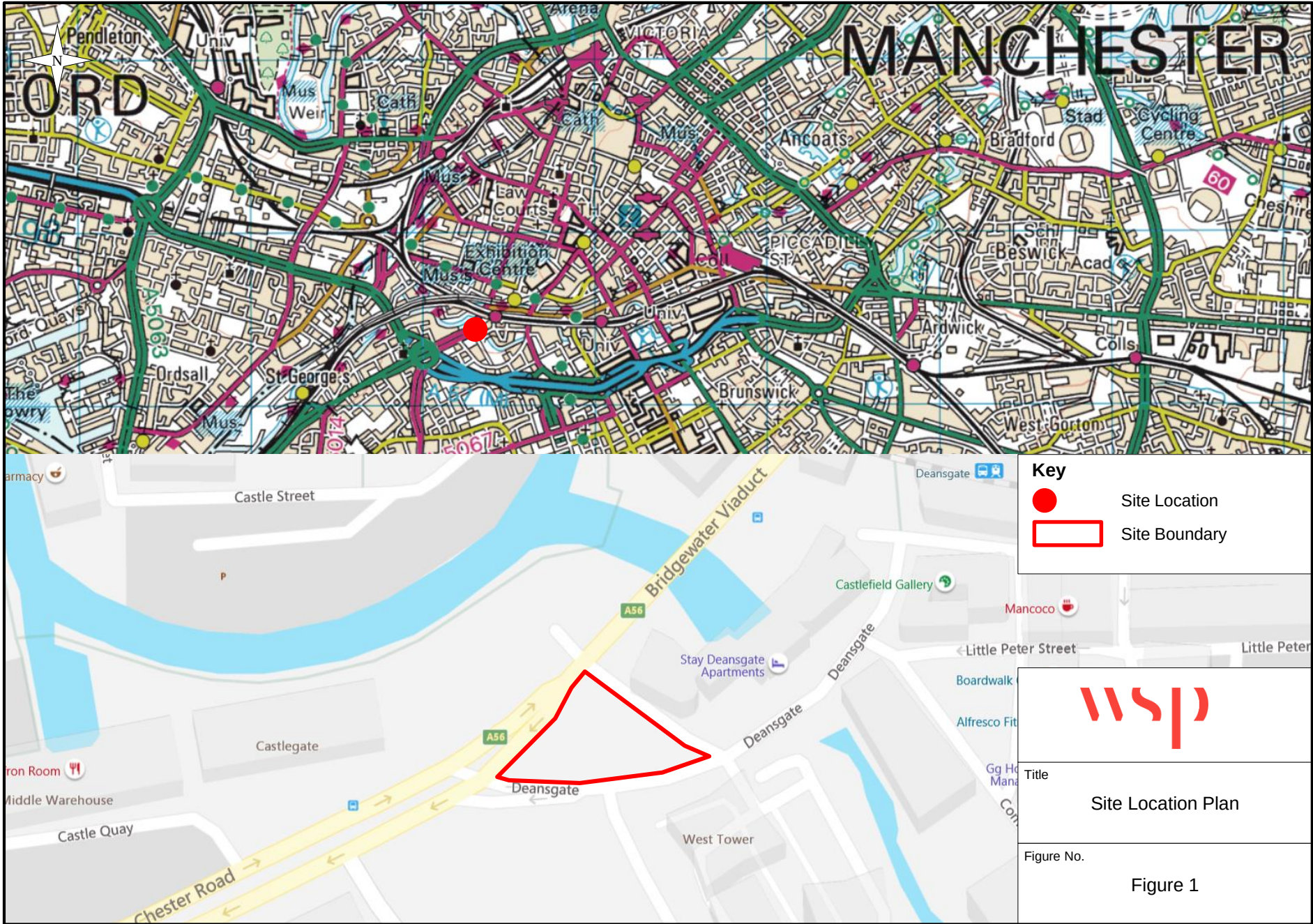
- A detailed UXO desk-based threat assessment is prepared to assess risks from UXO to intrusive ground investigation works and future ground works.
- Information on potential contamination from the contaminated land officer
- Information on below ground tanks and historical spills from the petroleum officer

Prior to undertaking any demolition works of the existing structures on the site an asbestos survey may be required to identify the presence or absence of ACM within the structures.

Appendix A

FIGURES



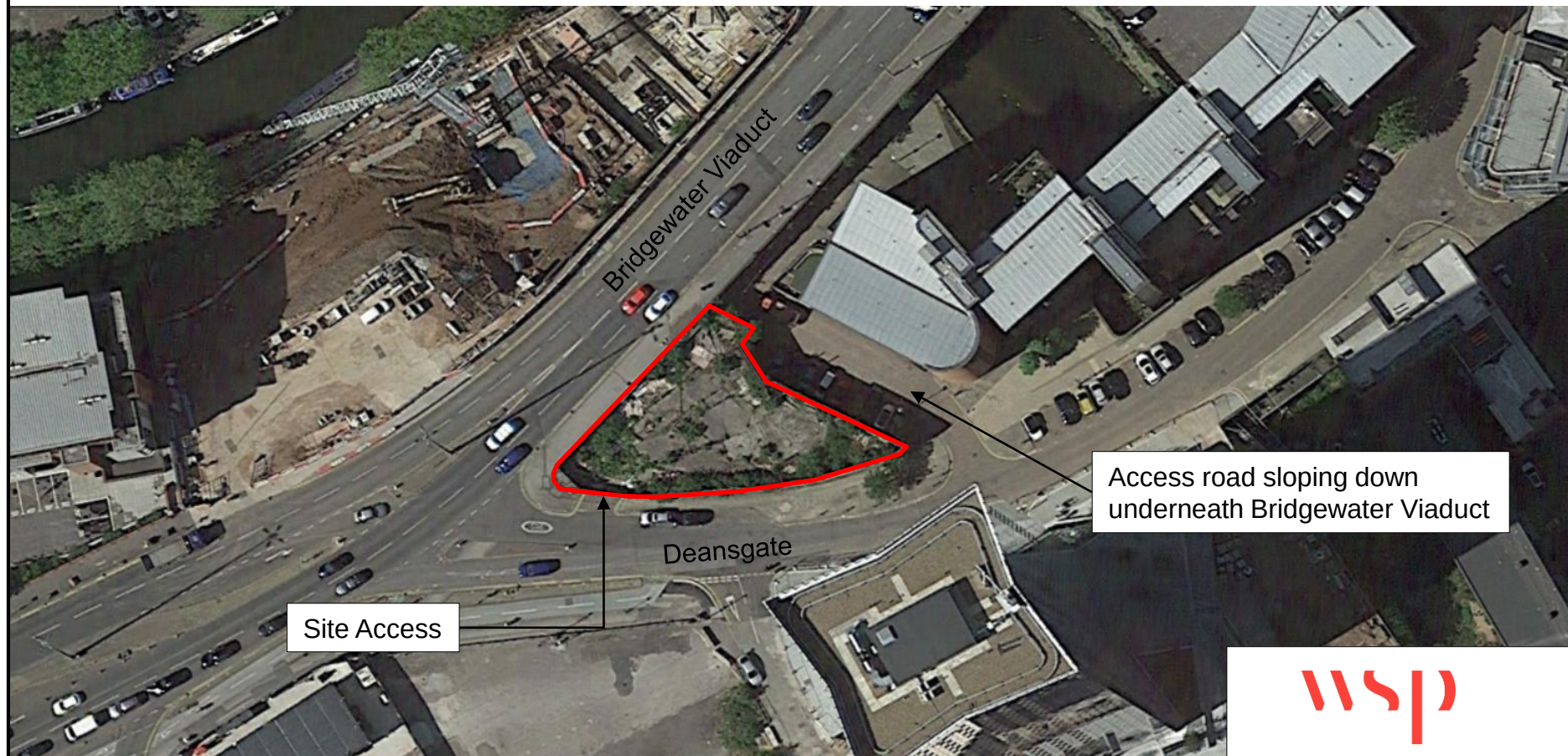




Key



Site Boundary

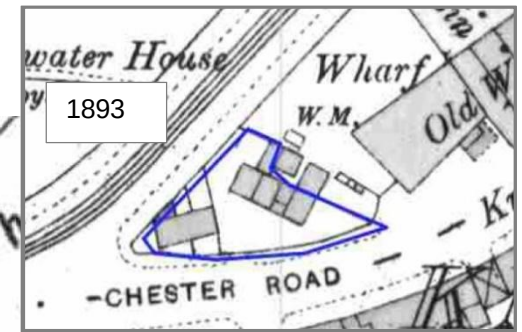
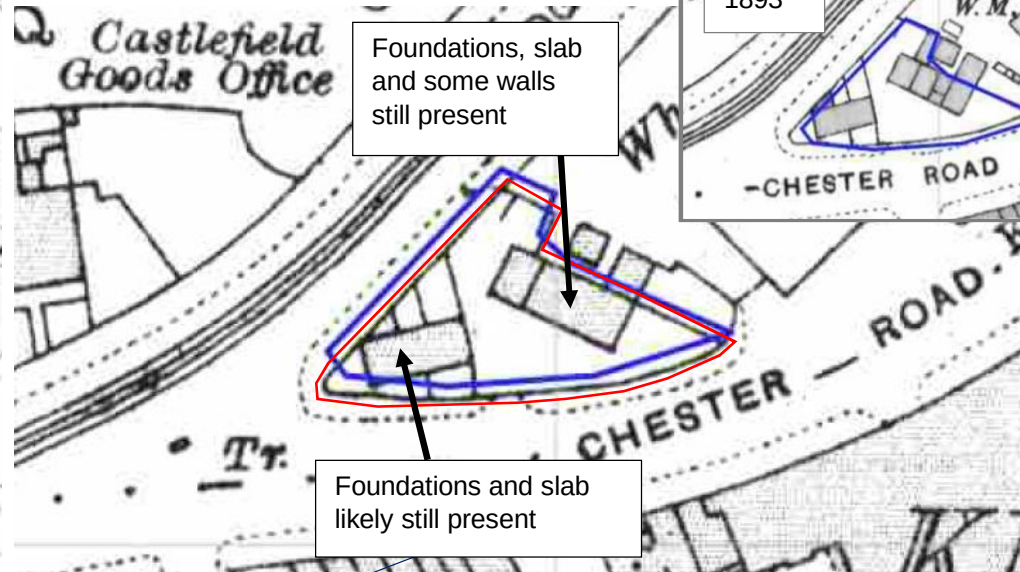
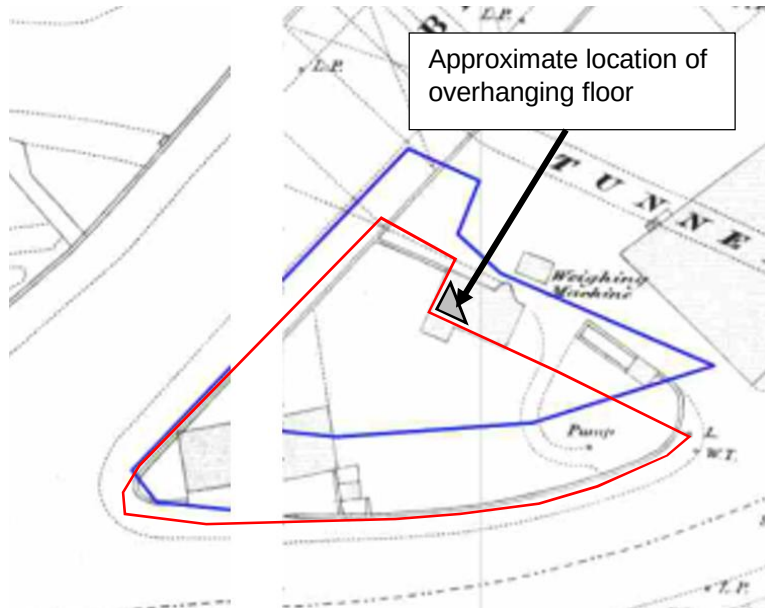


Title

Site Features Plan

Figure No.

Figure 2



Above: 1851 Part of site to NE – not split levels

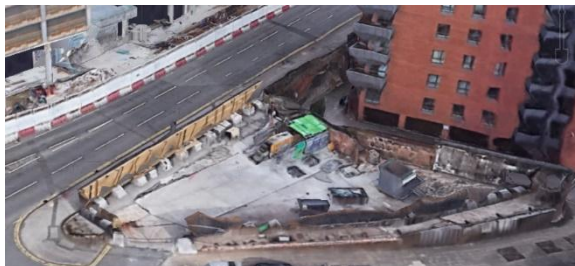
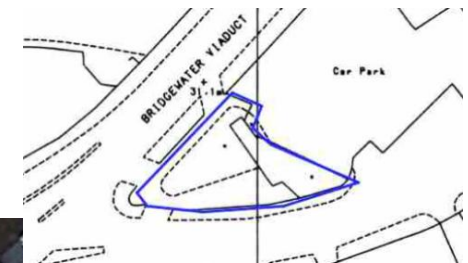
1922 (same as 1893) - split levels – likely raised by 1893 (same layout up to 1932)

Below: 1948 (building in SW removed)

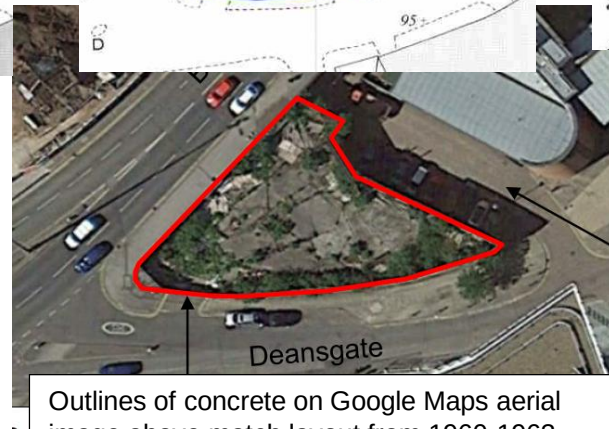
1951 (remaining building removed)

1960-1963 (new garage)

1986-1990 to present



Google Earth Pro aerial image (2020) below shows contemporary concrete slab and construction-related features.

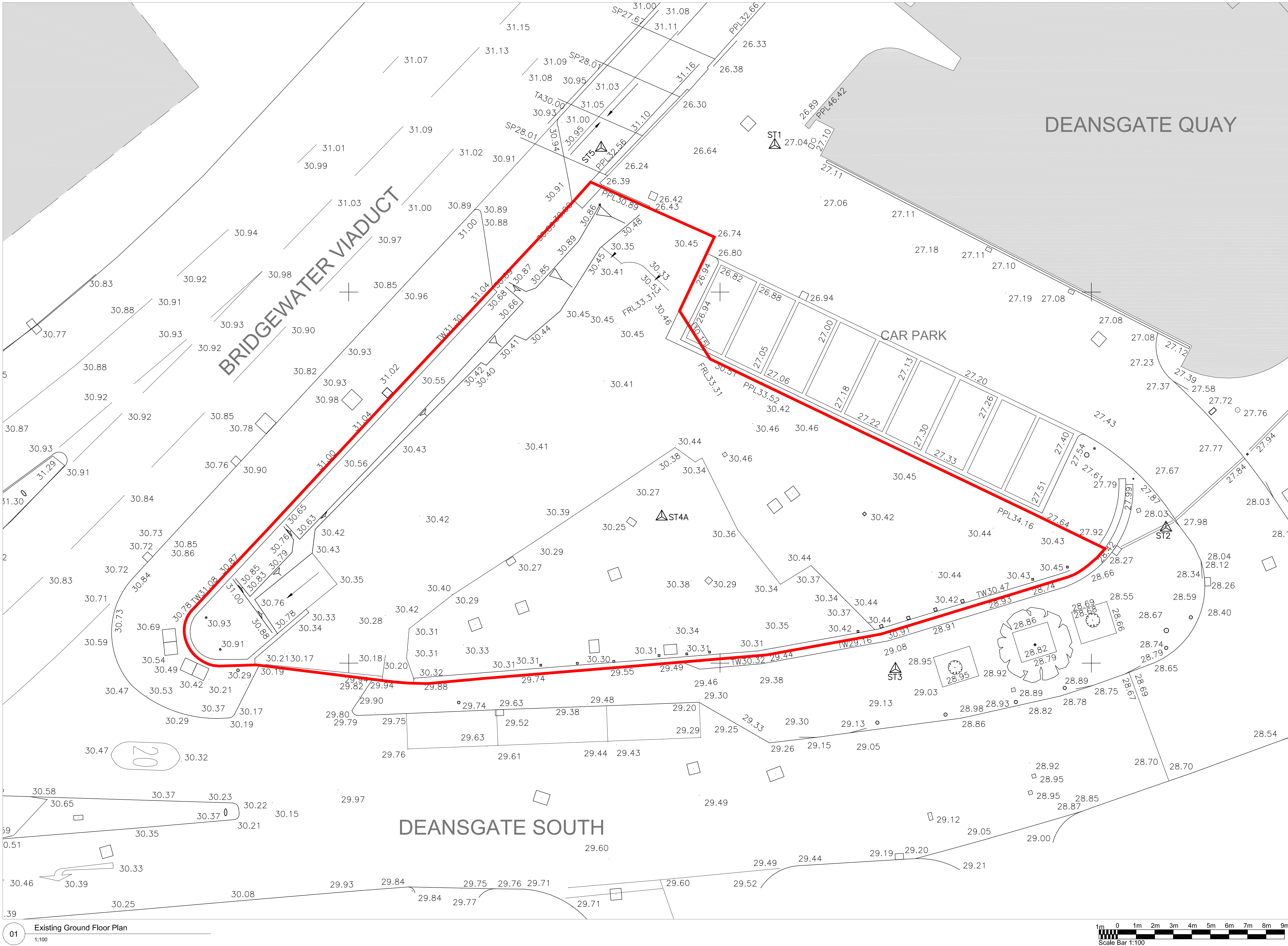


Outlines of concrete on Google Maps aerial image above match layout from 1960-1963.

Deansgate South

Figure 3: Historical information extracts





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Figured dimensions only to be taken from this drawing. DO NOT SCALE. All contractors must visit the site and be responsible for checking all setting out dimensions and notifying the architect of any discrepancies prior to any manufacture or construction work.

NOTES:



P-00	Planning Issue.	17.12.20	BH	CMc
Rev	Description	Date	Dr By	App By
Project Stage				

EXISTING

REV	DATE	NOTES	CHK
-----	------	-------	-----

Client

FUSION STUDENTS

Project

DEANS GATE SOUTH
MANCHESTER

Drawing Title

EXISTING
PLAN
GROUND FLOOR

Drawn	Checked	Paper Size	Scale	Date
BH	CMc	A1	1:100	NOV 2020

Project No.	Drawing No.	Revision
20269	0210	P-00

**CORSTORPHINE
+ WRIGHT
ARCHITECTS**

Warwick
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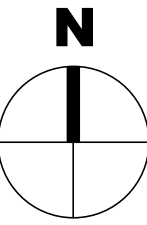
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All contractors must visit the site and be responsible for checking all setting out dimensions and notifying the architect of any discrepancies prior to any manufacture or construction work.

NOTES:



KEY

— SITE BOUNDARY

STUDENT ACCOMODATION

ONE BED 22 SQM

STUDIO 18 SQM

SOCIAL STUDIO 15 SQM

EN-SUITE 12.5 SQM

TWODIO 30 SQM

SOCIAL SPACE

PLANT/ CYCLES/ BINS

P-01	Updated for Planning Issue.	17/12/2020	BH	CMc
P-00	Planning Issue.	04/12/2020	BH	CMc
Rev	Description	Date	Dr by	App by

Project Stage

PLANNING

Client:

Fusion Students

Project:

Deansgate South
Manchester

Drawing Title:

Proposed - Plan - Ground Floor

Drawn	Checked	Paper Size	Scale	Date
BH	CMc	A1	1 : 100@A1	02/12/20

Drawing No.	Revision
20269-0311	P-01

Drawing BIM Name:
12345-CW-XX-ZZ-M3-A-XXXX-S1.RVT

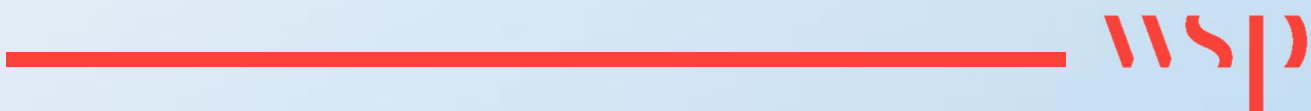
CDE Area:	Suitability Code:	BIM Revision:
		P01.04

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Appendix B

SITE PHOTOGRAPHS AND NOTES



18 January 2021



Photo 1: Site location from south (Chester Road on left, Deansgate on right) – black hoarding around site

wsp



Photo 2: Black hoarding along north-western boundary (Chester Road/Bridgewater Viaduct)

wsp

18 January 2021



Photo 3: Site general view looking towards northeast, showing contemporary concrete slab and walls along north-eastern boundary

wsp



Photo 4: Eastern corner of site looking from east, showing ground level change along Deansgate and access road under Bridgewater Viaduct

wsp

18 January 2021



Photo 5: North-eastern part of site

wsp



Photo 6: Southern boundary looking towards the east

wsp

18 January 2021



Photo 7: North western corner looking north

wsp



Photo 8: General site view looking south from northern corner

wsp

18 January 2021



Photo 9: Northern corner showing west side of remaining wall

wsp



Photo 10: View down to access road beneath Bridgewater Viaduct, looking towards the southeast

wsp

18 January 2021



Photo 11: Broken manhole cover in eastern area

wsp



Photo 12: Concrete ramp at western corner

wsp

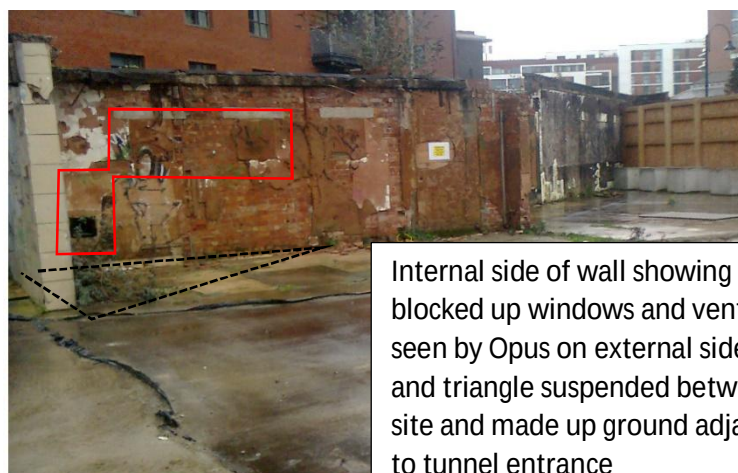
Site walkover notes, Paula Gallagher 18/1/21
Knott Mill site – Deansgate/Bridgewater Viaduct



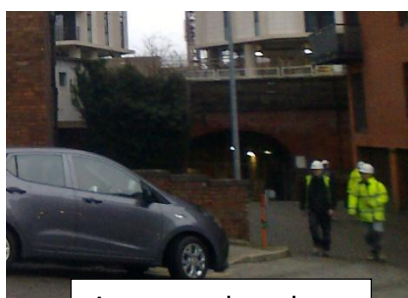
Opus photo 2015 – two windows and vent



WSP photo 2021 – vent covered with vegetation



Internal side of wall showing two blocked up windows and vent as seen by Opus on external side – and triangle suspended between site and made up ground adjacent to tunnel entrance



Access road passing under Bridgewater viaduct in tunnel

Appendix C

GROUNDSURE REPORT



Appendix D

BGS LOGS



SJ89NW 8334 9736 1219

	Location Lower Medlock UCISO's C/1 Site 0276		Borehole No. BH302	
	Client: BeWT		Project Ref.: 9-00-00-910	
Equipment and methods Light cable percussion				
Job No.: 9069/63	Start Date: 21/01/1998	End Date: 22/02/1998	Final Depth: 4.90m	Casing Diameter 150mm Casing Depth 4.00m

FIELD RECORDS	Samples / Tests				Description	Depth & Thickness (m)	Strata Reduced Level (m)	Legend
	Casing (Water) Depth (m)	Depth (m) from	to	SAMPLE Type & No SPT (N) (Cu)				
		0.50		D 1	MADE GROUND (200mm of setts over ash)	(0.30) 0.30	31.61	
		1.20	1.65	B 1 S 1	MADE GROUND (loose brown clayey sandy rubble and brick)	(1.60)		
3, 3 -2, 2, 2, 3		2.00	2.00	B 2 S 2	Loose brown clayey SAND with much fine to coarse gravel	1.90 (0.60)	30.01	
1, 2 -2, 2, 3, 2		2.80	3.20	U 1	Stiff brown slightly sandy CLAY with occasional fine to coarse gravel	2.50 (1.30)	29.41	
[u45]		3.30		D 2				
[u80]		3.50	3.80	U 2				
100/75mm - (21/02/1998)-		3.50	4.00	B 3 S 3	Red/brown highly weathered SANDSTONE	3.80 (1.10)	28.11	
T1 M1 100/50mm 4.50 - (22/02/1998)-		4.00	4.60	S 4				
					Borehole Completed	4.90	27.01	

Remarks 1) Service pit dug 0.60m x 0.60m x 1.20m 2) Borehole dry 21/02/98 3) Water met at 4.50m with no rise 4) 1 hour shelling from 4.00m to 4.90m 5) Borehole continued by rotary drilling	Logged by LW Drilled by CB Ground level 31.91mAD Co-ordinates:
---	---

1220

ISSI-subtle per 08/06 Rev a1

SJ89NW 8334 9742 1221

 STRATA SURVEYS LIMITED Job No.: 9069/63	Location Lower Medlock UCISO's C/1 Site 0276 Client: BeWT Project Ref.: 9-00-00-910		Borehole No. BH304	
	Equipment and methods Light cable percussion Start Date: 21/02/1998 End Date: 21/02/1998 Final Depth: 4.70m Casing Diameter: 150mm Depth: 4.00m			
FIELD RECORDS 1. 0 -1 .0 .1 .1 [u16] 3. 3 -4 .5 .4 .6 100/25mm T1 M1 4.30 4.30 100 25mm -(21/02/1998)-	Samples / Tests Casing (Water) Depth (m) Depth (m) from to SAMPLE Type & No SPT (N) (Ca)		Description MADE GROUND (brick rubble and concrete) MADE GROUND (firm brown orange/brown sandy clay with occasional fine to medium gravel and brick) MADE GROUND (very loose brown clayey very sandy fine to coarse gravel with brick - B1) Medium dense light grey and brown slightly clayey silty fine to medium SAND with occasional fine to medium gravel Red/brown weathered SANDSTONE Borehole Completed	Strata Depth & Thickness (m) Reduced Level (m) Legend
	0.50 D 1 1.20 1.20 B 1 (3) S 1 2.50 2.90 U 1 {58} 3.00 3.00 3.45 B 2 (19) S 2 3.80 3.80 3.80 B 3 ((1200)) S 3 4.00 4.60 4.60 S 4 ((1200))			
Remarks 1) Service pit dug 0.60m x 0.60m x 1.00m 2) Chiselling for 1 hour from 3.80m to 4.70m 3) Water met at 4.30m with no rise 4) Borehole continued by rotary drilling			Logged by LW Drilled by CB Ground level 28.60mAD Co-ordinates:	

SJ89NW 8333 9739 1222

 Job No.: 9069/63	Location Lower Medlock UCSO's C/1 Site 0276		Borehole No. BH305					
	Client: BeWT		Project Ref.: 9-00-00-910					
Equipment and methods Light cable percussion								
Start Date: 20/02/1998		End Date: 20/02/1998		Final Depth: 2.10m				
		Casing Diameter 150mm		Depth 1.50m				
FIELD RECORDS	Samples / Tests			Description	Depth & Thickness m	Strata Reduced Level (m)	Legend	
	Casing (Water) Depth (m)	Depth (m) from to	SAMPLE Type & No					SPT (N) (Cu)
5, 6 -14, 16, 19, 25		0.90 1.35	B 1 S 1	(74)	MADE GROUND (brown clayey sandy brick and rubble)	(0.90)	28.38	
		0.90			Red/brown highly weathered SANDSTONE becoming less weathered with depth	(1.20)		
50, -(20/02/1998)-	1.50	2.00 2.00	D 1 S 2		Borehole Completed	2.10	27.18	
Remarks								
1) Service pit dug 0.60m x 0.60m x 0.90m 2) 1 hour shelling from 0.90m to 2.00m 3) ISPT S2 - bouncing 4) No water encountered 5) Borehole continued by rotary drilling								
Logged by LW						Drilled by CB		
Ground level 29.28mAD						Co-ordinates:		

Appendix E

ZETICA UXB RISK MAP

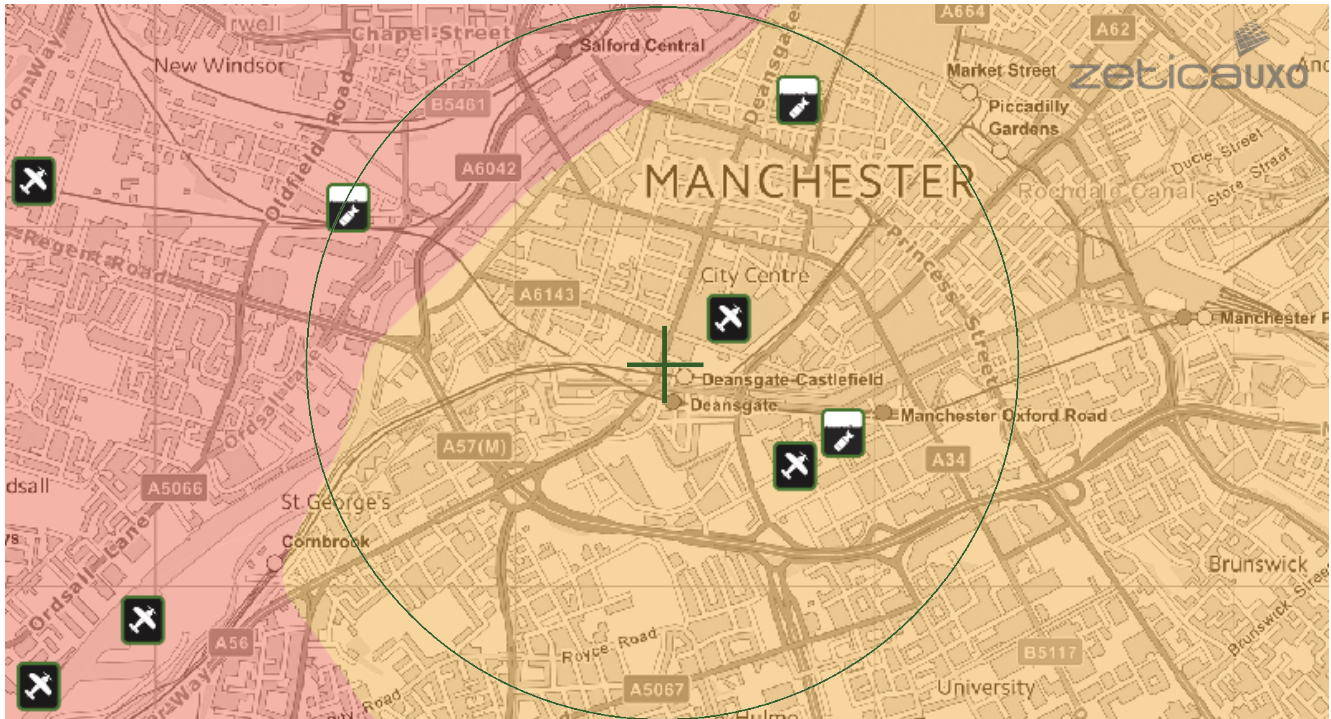


UNEXPLODED BOMB RISK MAP



SITE LOCATION

Location: M3 4LQ,
Map Centre: 383423,397621



LEGEND

- High:** Areas indicated as having a bombing density of 50 bombs per 1000acre or higher.
- Moderate:** Areas indicated as having a bombing density of 15 to 49 bombs per 1000acre.
- Low:** Areas indicated as having 15 bombs per 1000acre or less.

- military**
- industry**
- UXO find**
- transport**
- dock**
- Luftwaffe targets**
- utilities**
- Bombing decoy**
- other**

How to use your Unexploded Bomb (UXB) risk map?

The map indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing.

You can incorporate the map into your preliminary risk assessment* for potential Unexploded Ordnance (UXO) for a site. Using this map, you can make an informed decision as to whether more in-depth detailed risk assessment* is necessary.

What do I do if my site is in a moderate or high risk area?

Generally, we recommend that a detailed UXO desk study and risk assessment is undertaken for sites in a moderate or high UXB risk area.

Similarly, if your site is near to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended.

More often than not, this further detailed research will conclude that the potential for a significant UXO hazard to be present on your site is actually low.

Never plan site work or undertake a risk assessment using these maps alone. More detail is required, particularly where there may be a source of UXO from other military operations which are not reflected on these maps.

If my site is in a low risk area, do I need to do anything?

If both the map and other research confirms that there is a low potential for UXO to be present on your site then, subject to your own comfort and risk tolerance, works can proceed with no special precautions.

A low risk really means that there is no greater probability of encountering UXO than anywhere else in the UK.

If you are unsure whether other sources of UXO may be present, you can ask for one of our **pre-desk study assessments (PDSA)**

If I have any questions, who do I contact?

tel: +44 (0) 1993 886682

email: uxo@zetica.com

web: www.zeticauxo.com

The information in this UXB risk map is derived from a number of sources and should be used in conjunction with the accompanying notes on our website: (<https://zeticauxo.com/downloads-and-resources/risk-maps/>)

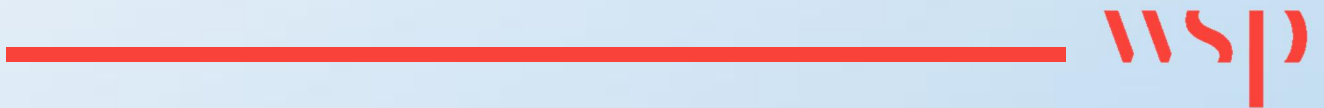
Zetica cannot guarantee the accuracy or completeness of the information or data used and cannot accept any liability for any use of the maps. These maps can be used as part of a technical report or similar publication, subject to acknowledgment. The copyright remains with Zetica Ltd.

It is important to note that this map is not a UXO risk assessment and should not be reported as such when reproduced.

*Preliminary and detailed UXO risk assessments are advocated as good practice by industry guidance such as CIRIA C681 'Unexploded Ordnance (UXO), a guide for the construction industry'.

Appendix F

HISTORICAL LAND USES TABLE AND
MEDLOCK TUNNEL INFORMATION



Deansgate South, Manchester
Historical Land Uses Table

Period	On Site	Off Site
1848-1851	An unspecified building with three smaller outbuildings occupies the western portion of the site. A second building is located at the north-eastern site boundary. A pump is shown in the eastern corner of the site.	The site is located in an area shown as Knott Mill which is dominated by industrial land uses. The site is shown to be bound by a road leading onto the Bridgewater Viaduct in the north and a second road leading onto Knott Mill Bridge in the south. A large building labelled as 'The Old Warehouse' is located directly northeast of the site, below which a tunnel is indicated to run. A smithy is located ca. 50 north-west; Knott Mill Iron Works is shown ca. 75m south-east. A cotton mill is ca. 75m east.
1893-1896	The building at the north-eastern site boundary appears to have been replaced by or extended to a larger structure. The pump in the eastern corner of the site is no longer shown.	The cotton mill to the east has been replaced by an iron foundry. Castle Field coal wharf is shown ca. 80m to the north-west. Castle Field Iron Foundry and Pryme Street Finishing Works are located ca. 140m to the north-west and 160m to the south-west of the site respectively. Deansgate train station lies ca. 120m north-east of the site.
1905-1908	No significant changes.	A sawmill is ca. 180m south-west. A printing works and gym and starch works are shown ca. 200m east of the site.
1922-1923	No significant changes.	The building to the north of the site is no longer labelled as 'The Old Warehouse'.
1932	No significant changes.	A steel tube warehouse, engineering works and cardboard box works are present between 100-250m east of the site. A joinery and paper works are 120m to the north-west.
1948-1949	The buildings in the south-western corner of the site are no longer shown.	The former old warehouse to the north is now labelled as Engineering Works. Automobile engineering works are shown ca. 75m north-east. A refuse heap is shown ca. 80m west of the site.
1951-1956	The building at the north-eastern site boundary is no longer shown.	The refuse heap to the west is no longer shown. Plastic moulding works are ca. 50m south of the site.

Deansgate South, Manchester
Historical Land Uses Table

Period	On Site	Off Site
1956	No significant changes.	No significant changes.
1960-1963	The site appears to have been redeveloped with a large section in the centre of the site being occupied by a building or working area, possibly a fuel station.	The remaining residential properties to the south-west of the site are now shown as commercial properties. A garage is located ca. 130m south of the site.
1969-1973	The building on site is now indicated as a garage.	The adjacent works to the north-east are now shown as a depot.
1980-1985	No significant changes.	A garage is located ca. 50m south of the site. Four garages are noted within 300m north of the site. The land formerly occupied by the Knott Mill works appears to be vacant.
1987-1992	A large building is present on site along most of the north-eastern site boundary.	The depot to the north-east and the former iron works to the south-east have been replaced by car parks.
1992-1995	No significant changes.	The land formerly occupied by the Knott Mill works is now shown as a car park.
2002	No significant changes.	No significant changes.
2010	The site appears to be vacant.	No significant changes.
2014	No significant changes.	No significant changes.

70081132 – Deansgate, Manchester – Historical off-site Tunnel Information

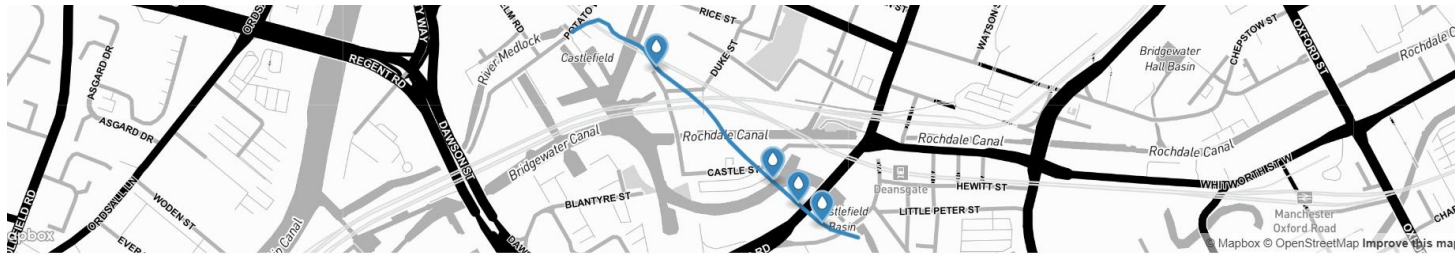
WSP realignment of site boundary 1851 map (Groundsure boundary in blue, WSP boundary in red)



'Tunnel' – information available online indicates this is the Medlock Diversion Tunnel, which takes excess water from the River Medlock beneath the canal basin (See over)

M Hidden Manchester Map

Tunnels, rivers, mines & subterranean spaces of Hidden Manchester

[Map](#)[About the Map](#)[All Features](#)[Sources](#)

> Medlock Diversion Tunnel

Here the Medlock is diverted via a siphon underneath the Bridgewater canal. Before this tunnel was built the river supplied the Bridgewater, but this was no longer necessary when the connection to the Rochdale Canals was made. The pins on the map represent ventilation grids. The tunnel and associated overflow are [grade II listed structures](#).

You can see the route of this tunnel in [Adshead's illustrated map of St John's Ward](#) from 1851. Slightly further downstream the Bridgewater canal overflows through [a weir named Giant's Basin at Potato Wharf](#) into the Medlock. There is a great bit of history for this stretch of the Medlock on [Grace's Guide to British Industrial History](#). I'm not sure exactly when the tunnel was completed, but if this passage by James

Castlefield Basin Culvert

Build around 1790 this tunnel was built underneath the Castlefield Basin to deal with the excess waters of the River Medlock not used to supply water to the Bridgewater Canal. The Medlock drops into a plughole and can be traced on maps heading underneath the canals and streets of Castlefield to its outfall at Potato Wharf.



Appendix G

CIRIA RISK RANKING INFORMATION



CIRIA RISK APPRAISAL METHODOLOGY

Assessing potential risks from potentially complete “contaminant linkages” is key to the evaluation of contaminated land. An approach based on the UK CIRIA report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001) has been adopted within this report to estimate the level of risk associated with each potentially viable contaminant linkage. Risk from contamination is determined by a combination of:

- The magnitude of harm that will be caused if the contaminant linkage is present; and
- The likelihood that the contaminant linkage is present.

Table 1 summarises the CIRIA definition of four levels of severity / magnitude of harm. The probability of the harm occurring is classified by criteria given in Table 2.

TABLE 1 CLASSIFICATION FOR SEVERITY

Classification	Definition
Severe	Acute effects on human health; Major pollution of controlled waters (watercourses or groundwater)
Medium	Chronic (long-term) effects on human health; Pollution of sensitive controlled waters (surface waters or aquifers)
Mild	Pollution of non-sensitive water resources.
Minor	Requirement for protective equipment during site works to mitigate health effects; Damage to non-sensitive ecosystems or species

TABLE 2 PROBABILITY OF RISK OCCURRING

Classification	Definition
High Likelihood	Contaminant linkage may be present, and harm is almost certain to occur in the long term, or there is evidence of harm to the receptor.
Likely	Contaminant linkage may be present, and it is probable that harm will occur over the long term.
Low Likelihood	Contaminant linkage may be present and there is a possibility of harm occurring, although there is no certainty that it will do so.
Unlikely	Contaminant linkage may be present but the circumstances under which harm would occur are improbable.

The risk levels are determined by combining severity and probability, as presented in Table 3.

TABLE 3 RISK CATEGORY FROM COMBINATION OF SEVERITY AND PROBABILITY

RISK CATEGORIES		Severity of Harm			
		Severe	Medium	Mild	Minor
Probability of Harm	High Likelihood	Very high risk	High risk	Moderate risk	Moderate / low risk
	Likely	High risk	Moderate risk	Moderate/ low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/ low risk	Low risk	Very low risk
	Unlikely	Moderate / low risk	Low risk	Very low risk	Very low risk

Table 4 then provides a description of the typical consequences and potential actions required following each risk definition.

TABLE 4 QUALITATIVE RISK ASSESSMENT - CLASSIFICATION OF CONSEQUENCE

Classification	Definition
Very High Risk	Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken.
High Risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term.
Moderate / Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as Moderate. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild.
Very Low Risk	Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild.

Appendix H

REPORT LIMITATIONS



REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.
3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.
4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.
6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.
7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.
8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:
 - i. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
 - ii. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.
10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.
11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.
12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.
13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.
14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.
15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.
16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.
18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.
19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.
20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.
22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.



REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

- 24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.
- 25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

- 26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

- 27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.
- 28. The data is presented and will be compared with assessment criteria.



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